

# ANNALS of SURGERY

A Monthly Review of Surgical Science and Practice

Edited by

LEWIS STEPHEN PILCHER, M.D., LL.D.

of New York

With the Collaboration of

SIR WILLIAM MACEWEN, M.D., LL.D.  
of Glasgow

W. H. CLAYTON GREENE, F.R.C.S.  
of London

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J. B. LIPPINCOTT COMPANY, PUBLISHERS  
MONTREAL

PHILADELPHIA

LONDON

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# ANNALS of SURGERY

VOL. LXXV

MAY, 1922

No. 5

## ANOMALOUS ABDOMINAL MEMBRANES\* THEIR INFLUENCE UPON THE DIGESTIVE TRACT

BY ALFRED S. TAYLOR, M.D.  
OF NEW YORK, N. Y.

BECAUSE of the tediousness of an attempt at detailed discussion of the many complexities, anatomical, pathological, and symptomatic, associated with this subject, it has seemed best to present the general considerations for discussion at this time, reserving for more complete presentation, in later communications, the different groups involved. No attempt is made to follow the chronological history of the development of the subject, nor to present a complete bibliography, nor to claim any priority or originality in the matter.

This paper is based upon a series of personal cases operated upon since 1914, of which the first fifty are taken because sufficient time has elapsed to get an idea of end-results.

The membranes encountered in this series were in the following groups: (1) Hepato-duodenal and hepato-duodeno-colic. (2) Duodeno-jejunal. (3) Jackson's membrane, or pericolic membrane. Associated with this last were certain anomalies of the omentum in a small percentage of the cases, and a chronic appendicitis in many cases. Any one, any two, or the entire combination may appear in the individual patient. In a considerable number the appendix had already been removed without relief, so that post-operative adhesions were added to the pathological picture. Scattered irregularly through the series have been occasional complications such as ulcer, biliary calculi, cholecystitis, perihepatitis, pelvic disturbances, etc.

*The hepato-duodenal*, and its modification, the *hepato-duodeno-colic* membrane, runs from the cystic duct and a greater or less portion of the gall-bladder, down to the first portion of the duodenum, running from the apex toward, and often as far as, the pylorus. When there is a colic part to the membrane, it is usually a continuation downward from the duodenum and pylorus to the beginning of the transverse colon. This membrane is nearly always made up of two distinct leaves, just as is the mesentery of the intestine. Usually it is thin and transparent, just as is the peritoneum. There is seldom much vascularity in the membrane. In the majority of instances the membrane involves from one-third to one-half of the lower

\* Read before the New York Surgical Society, January 25, 1922.

border of the gall-bladder. In a few cases it extends outward to the fundus and in at least two instances a double membrane extended from 1 to 2 cm. beyond the fundus, and was continuous with the peritoneal covering of the liver. In certain instances the membrane is very narrow and involves only the cystic duct. It extends to the first portion of the duodenum and often to the pylorus. Most of the illustrations, which have appeared in various articles on this subject, have shown these membranes going down to the duodenum, usually with the portion going from the cystic duct reaching the duodenum toward the pylorus, and the outer edge of the membrane running from the under surface of the gall-bladder to the apex of the duodenum. This gives a different picture from that which has been seen in this present series of cases, in which, in every instance where the membrane was sufficiently well developed, the portion running from the cystic duct went directly to the apex (the junction of the first and second portions of duodenum) of the duodenum, and then extended out upon the gall-bladder toward the fundus and down upon the first portion of duodenum toward the pylorus, so that the free edge extends from the under surface of the gall-bladder to the duodenum near or at the pylorus.

In a number of instances the pylorus and beginning duodenum have been directly in contact with the fundus of the gall-bladder, and the first portion of the duodenum has then run along the gall-bladder to the cystic duct. The membrane has then consisted of a fold running on each side directly from the gall-bladder to the duodenum with unperitonealized surfaces at least 1 cm. wide between the duodenum and gall-bladder.

In addition to these peritoneal membranes, there have, in a few instances, been entirely separate cicatricial adhesions running from the duodenum to the under surface of the liver, either just to the right or just to the left of the cystic duct. In certain cases, without there having been any anomalous membrane, the gastrohepatic omentum has been unusually short, and its free edge quite thickened and rigid has extended somewhat to the right so that the apex of the duodenum has been elevated, firmly fixed and angulated. In two cases (VI and XXII) the membrane was so situated about the cystic duct as to cause a constriction and a sharp angulation with symptoms of biliary colic which will be referred to later. In one case (of a later series) the duct was given a double angulation by the drag downward of this membrane. Extension of the membrane to the colon often causes high fixation with angulation or constriction, or both, and usually fastens the pylorus or the antrum and the transverse colon closely together so that the overfilling of either one interferes with the function of the other.

This membrane acts to interfere with the digestive function in several ways. The apex of the duodenum is practically always fixed at an unusually high level beneath the liver and is also dragged distinctly backward. It is usually rather firmly held in one position with only slight mobility. The membrane often reaches across the front of the duodenum in such a way as to cause compressions and kinking in addition to the high fixation. In

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several cases where the membrane reached from the apex of the duodenum downward obliquely across the front of its first portion to the lower edge of the pylorus, there was added torsion, on its long axis, of the first portion of the duodenum. Further, in many cases, if the membrane runs well out upon the gall-bladder, it reaches the first portion of the duodenum after passing across the front of the descending duodenum so that in this way there is added a certain amount of compression of the descending duodenum.

In these cases where the stomach has gradually dilated in consequence of the continuous partial obstruction to its proper evacuation, the pyloric end of the stomach will be pushed over well to the right of the mid-line and then because of the fixed position of the first part of the duodenum it bends sharply backward, inward and upward. This adds kinking in the pyloric antrum which also adds to interference with gastric function. This angulation of the antrum has been repeatedly demonstrated upon the operating table. When the obstruction has continued long enough, the stomach becomes considerably dilated and we have the perfectly typical ptyped fish-hook type of stomach, in which the first portion of the duodenum will not infrequently be elongated because of the downward drag of the stomach on the fixed apex of the duodenum.

Anomalous membranes about the duodeno-jejunal angle are quite variable and can hardly be put into groups or classes. In some cases the ligament of Treitz is anomalous; it extends upward and to the left and pulls the angle far upward and outward—causes sharp compression from extending over its anterior surface, and causes sharp angulation because of its high elevation. This has several times been the cause of marked obstruction with resultant great dilation of the dependent duodenum.

In one instance the beginning jejunum curved from the "angle" in front and over to the right of the superior mesenteric vessels where a double fold of thin, transparent peritoneum ran upward and to the right, fusing with the inferior mesocolon, and then the jejunum ran sharply to the left again. This made a regular Z-shaped, double-kinked deformity resulting in serious interference with the function of the duodenum.

In a number of instances the peritoneum in front of the superior mesenteric vessels has been very considerably thickened and in two instances there have been small calcified lymph-glands in the same situation.

At this point one should at least mention certain other forms of duodenal obstruction, although they are not the result of these anomalous peritoneal membrane formations. These other types of obstruction have been well described by Kellogg and have to do with obstructions from the mesenteric vessels and certain kinkings and adhesions retroperitoneally. In one of the cases, following this series of fifty, there was distinct constriction of the descending duodenum by fibrous tissue in the transverse mesocolon where the duodenum passed behind it.

The result of these anomalous membrane formations, as well as other types of obstruction, is to cause marked dilation of the duodenum proximal

to the obstruction. There is, of course, great interference with the proper function of the duodenum with resulting symptomatology later to be mentioned.

*Jackson's membrane*, or *pericolic membrane*, is another of the very atypical, anomalous membranes. It would perhaps be better to call these membranes by the term pericolic, inasmuch as Doctor Jackson objects that many men are reporting cases under the title of "Jackson's Membrane" which are not truly such. The term, "Jackson's Membrane," has been used in the records of these cases to indicate membranous formation running from the outer side of the cæcum and ascending colon up to and across these portions of the gut. The most extensive membranes involve the cæcum and ascending colon up to and including the hepatic flexure. On the other hand, there may be present merely a small, narrow band of membrane located either at the hepatic flexure or, more commonly, about the middle of the ascending colon, or in relation to the beginning ascending colon just above the cæcum. Between these limits there may be any variation as to the extent and development of these membranes. They may be sufficiently loose so that they pass in front of the gut like a loose, superficial veil, which has no influence whatever upon the functioning of the gut. On the other hand, the membrane may be so thickened, so short and so placed as to cause very serious distortion, compression and kinking of the lumen of the gut. In the well-developed, extensive membrane, there may be areas of thickening which cause distortion and compression of the gut at the place where they are situated, while the major portion of the membrane may be exerting no disturbing influence. The thickenings in such membranes are most apt to be situated at the hepatic flexure, at the middle of the ascending colon, and at the beginning of the ascending colon. Frequently the thickenings at the hepatic flexure and beginning of ascending colon are at the edges, upper and lower, of the membrane, while there is very frequently a third thickened band at about the middle of the membrane, running across the middle of the ascending colon. Usually the upper edge of such extensive membrane runs obliquely from above downward and inward, arising from parietal peritoneum just above right edge of liver, while the lower edge, as a rule, runs obliquely from below upward and inward, the membrane thus being somewhat fan-shaped with the spread of the fan along the right flank, where it is fused with the parietal peritoneum. These membranes usually can be slipped freely over the true peritoneal coat of the gut. They mostly fuse with the peritoneum of the gut along its anterior convexity, but may cross it and fuse with the inner mesocolon. Sometimes they are somewhat thinner than normal peritoneum and show many fine blood-vessels which run transversely to the long axis of the gut. The origin of the membrane from the right flank is practically always upon a level with the posterior wall of the gut so that in passing across in front of the gut it necessarily goes well forward and then inward. When the bands associated with the membrane begin to

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shorten, it is readily understood how the intestine must be compressed and kinked and distorted.

Another anomalous formation is occasionally seen in the distribution of the great omentum. Instead of its right border being situated slightly to the left of the hepatic flexure, the origin of the omentum passes around the hepatic flexure and down the front of the ascending colon for a variable distance. The effect of this unusual distribution of the omentum is nearly always to firmly fix together the ascending colon and beginning of transverse colon so that they are in immediate contact, frequently to a point down to the middle of the ascending colon and occasionally even down to the upper end of cæcum. The effect of this distribution is to cause a sharp angulation at the hepatic flexure and to cause interference with the proper peristalsis of both limbs of the gut. Another modification of this type of omental anomaly is that in which the right edge of the omentum passes obliquely downward and to the right across the beginning of ascending colon, or upper end of cæcum, and becomes fused with the parietal peritoneum on the outer side of the gut, or becomes fused with, or adherent to, a true pericolic membrane.

Another element often related to the etiology of the symptoms in these cases is the circumstance of adhesions between the omentum and the operative scars which have been made in a more or less vertical direction through the abdominal wall, for many of these patients have been subjected to appendectomy or exploration without benefit. Where these adhesions have become somewhat thick and firm, the transverse colon is usually pulled downward, and not infrequently the adherent omentum passes obliquely across the ascending colon, or cæcum, and causes interference with its function either by pressure or by adhesions to the gut. The effect of these anomalous membranes, whether by distortion, angulation or compression, is to interfere with the proper peristaltic progress. There results a stasis in the cæcum and part of the ascending colon with the natural result of fermentation occurring in the gut contents. After a time the cæcum begins to dilate and to lose its strength, the ileocæcal valve may become incompetent and ileac stasis and regurgitation through the ileocæcal valve result; also after a time the appendix begins to give symptoms of irritation which, to my mind, are the result of this gradual distention of cæcum, resulting in back pressure, which interferes with the proper emptying of the appendix. Also the fermentation in the cæcum is apt to cause irritation, both to its own mucous membrane and to that of the appendix.

The experience with this whole group of cases has led to the conviction that many of the so-called chronic appendices are the result of disturbances of just this type. If this be so, the failure of appendectomy to cure, in a high percentage of cases of so-called chronic appendicitis, is readily explained because the removal of the appendix does not deal with the essential causative factor of the trouble, the appendix itself being involved only secondarily in the development of this condition.

Concerning the derivation of these anomalous membranes, there has been

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much discussion. One group believes them to be entirely congenital and to be the result of anomalies developed during the process of fusion of the peritoneum after the rotation of the gut. Konjetzny, in a series of dissections on new-born infant cadavers, has found them present in from fifteen to twenty per cent. of children. Harvey, of New Haven, has also dissected a large series of infants and has also found these membranes present in from fifteen to twenty per cent. of the cases. His work is very inclusive and conclusive in favor of these membranes being purely developmental rather than the result of inflammatory activity in the digestive tube. Nevertheless, there are many surgeons who maintain that these membranes are entirely the result of chronic inflammatory conditions, and attempt to explain their presence in new-born children on the basis of a prenatal inflammatory process. While such inflammation has been recorded as present in several foetuses, it is difficult to believe that such prenatal inflammation would occur in from fifteen to twenty per cent. of the children born. It would also be curious if this inflammatory process, both prenatal and postnatal, should elect to involve the various circumscribed areas in which they are found, to the exclusion of the major part of the peritoneum. It is also suggestive that these areas are located just where the peritoneal fusions are most complicated, with the obvious corollary that anomalies are, therefore, most likely to occur. Moreover, in the majority of instances in adults where these membranes have been dealt with, except for the anomalous distribution, they have had all the characteristics of normal peritoneum, the two layers of which have been held together by delicate areolar tissue.

These statements can be made with the least hesitation about the hepatoduodenal group. Even in this group additional connective tissue, both within and outside of the membrane, but closely associated with it, occurs with sufficient frequency to require explanation. In the group at the duodenojejunal angle additional thickening is present in a higher percentage of cases, and in the pericolic group in a percentage somewhat higher than in either of the other two groups. These facts have led me to the conviction that these membranes are primarily the result of anomalies in the fusion of the peritoneum, and that the thickenings occasionally found result from chronic traction, or chronic irritation from toxins or low-grade infections arising within the gut. This deduction would seem to harmonize the anatomical findings in the new-born, and the varied findings in the older operative cases, more satisfactorily than any other.

Many doubt that there is any relation between these membranes and symptomatology because troublesome symptoms usually appear only after twenty, thirty, forty or even fifty years, and yet the membranes, being congenital, have always been there. This argument is without value. Cervical ribs are congenital and yet they cause no symptoms until the possessor is from eighteen to fifty years old, and some patients never have symptoms, the ribs being discovered incidentally in the examination for other disturbances. Yet in the cases that have cervical ribs with symptoms, the removal

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of the ribs leads to the disappearance of the symptoms. Again, very young children with fractures of the lower end of the humerus, which have united with posterior deformity, will grow to adult life and then for the first time show symptoms of ulnar paralysis, unquestionably due to an ulnar neuritis, secondary to the fracture deformity which has been present for years. That these membranes do cause mechanical partial obstruction of the gut by angulation and constriction has been repeatedly demonstrated at the operating table. That partial obstruction of the gut causes marked and widespread interference with the orderly functioning of the digestive canal has been proven by the work of Alvarez, Keith, Cannon and others. These disorders of function are naturally followed by the symptoms which bring patients to the physician. Because the majority of these patients, who seek relief, have reached adult life, it was thought that these anomalous membranes did not cause symptoms during childhood and adolescence. However, in nearly every case, careful investigation will show that "weak stomach," "biliary attacks," etc., were common to the earlier years of life.

Moreover, C. G. Kerley, in a symposium on enteroptosis at the New York Academy of Medicine in the Spring of 1921, summarized a series of one hundred cases of infants and young children suffering from marked digestive disturbances and malnutrition. The Röntgen series in the various cases showed pictures just like those in adults where operation has verified the diagnosis of anomalous membrane. While the diagnosis in none of these children had been verified by operation, the clinical and Röntgen pictures together made it almost certain that these cases were showing early evidence of the evil effects of these anomalous membranes. Moreover, in Case XIX of this series, the symptoms were very marked in an eleven-year-old child and were entirely relieved by operation. Several cases in the series later than this first fifty have been in young children (one eight years old), so that it is evident that these membranes may cause symptoms at any period from infancy onward, and that it only remains to get familiar with the characteristic evidences.

Because of the great variability in the age at which definite symptom complexes appear, as well as in the acuteness with which they appear, it has seemed necessary to work out some explanation, based on the fundamental factors concerned, which would account reasonably for these variations in the group as a whole. As time has passed such an explanation has been evolved and is tentatively presented.

The fundamental factors are (1) The anomalous membranes which are congenital and, therefore, always potentially a menace.

The variables in this factor are: (a) The distribution of the membranes; whether present in one or more of the situations previously mentioned. (b) Their size in area and length. (c) Their thickness and rigidity. (d) Their anatomical relations to the digestive tube, which influence the degree of compression, kinking and distortion caused.

(2) The vital energy, both muscular and nervous, of the individual's digestive tube.

Variables: (a) The actual muscular development of the digestive tube. (b) The balance and quality of its innervation. (c) The endocrine balance; a factor the influence of which is not definitely known, but considered of great importance by endocrinologists. (See Timme.) (d) The general vitality and nervous balance of the individual which influence the previous variables. (e) The individual habit with regard to food; both as to frequency, quantity and quality.

As long as factor number 2 is able to overcome the partial obstructions caused by factor 1, with comparatively little effort, there will be no prominent symptoms.

If factor 1 causes more definite obstruction and factor 2 continues energetic, obvious symptoms occur of which pain is apt to be a prominent one. As soon as factor 2 suffers decompensation, then dilatation, stasis and "toxaemia" dominate the symptomatic picture. These phases merge into one another. Factor 2 may be seriously decompensated by any debilitating illness whether acute or long continued, and when decompensation has once occurred the handicap is so great that it cannot be overcome and the symptoms become steadily worse. Where decompensation has not been too serious, the original balance may be partially or completely restored, and so clinical variations occur. This has been the experience in a considerable percentage of the series of fifty presented. The fact that many of them have bilious attacks, cyclic vomiting or acidosis as children, then after puberty have less trouble or even recover for a number of years, lends weight to the argument of the endocrinologist. Consideration of these factors and their variables will at once indicate the innumerable combinations which may exist and modify the clinical history and symptomatic picture at any given time. For this reason it is almost impossible to allocate symptoms definitely to one or other of the anomalous membranes. It has, therefore, seemed best to go over the symptomatology of the series of fifty, as a whole, and then to attempt to group the symptoms accentuated by the different membranes.

Of the fifty, thirty-seven (seventy-four per cent.) were females and thirteen (twenty-six per cent.) were males. The ages ranged from eleven years to sixty-five, but there were very few less than twenty years old. Symptoms of indigestion had been present for periods varying from one and five-tenths to thirty-five years before operation. In some cases the trouble was continuous, in others intermittent, but in all cases it became gradually more troublesome and disabling during the few months, or years, preceding operation. It was noticed repeatedly in the various histories that the symptoms became markedly aggravated after a debilitating illness. In many cases there is a history of digestive disturbances from infancy.

In thirteen (twenty-six per cent.) cases the appendix had been removed; twice for acute suppurative appendicitis, but in the other eleven (twenty-two per cent.) apparently with the *hope* that the digestive disturbances would

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disappear, instead of which they were greatly aggravated. This was in the period when obscure digestive troubles were attributed to the effects of chronic appendicitis. One of the series had an exploratory laparotomy and another one two exploratory laparotomies without result in either case. Briefly the symptoms were: Nausea, intermittent but often frequent, in thirty-three (sixty-six per cent.) of the group. Vomiting in twenty-five (fifty per cent.). Many of them had typical recurring bilious attacks. Pain in forty-seven (ninety-four per cent.), which varied in character from acute, colicky pain (usually epigastric) to dull discomfort with a sense of distention, punctuated with gas pains (most definite in the right side). A sensation of dragging or pulling, frequently located by the patient accurately at the site where one of these anomalous membranes was pulling (proven at operation). Before operation this sensation could be relieved by posture, crouching forward or lying with pelvis elevated. Flatulence in forty-six (ninety-two per cent.). Usually very troublesome. Constipation in thirty-three (sixty-six per cent.), often of extreme degree. Diarrhoea in ten (twenty per cent.). Intermittent in most of them. (Complicating colitis.) Toxaemia, so-called, in forty-two (eighty-four per cent.). Headache, troublesome, in thirty (sixty per cent.). Loss of weight in twenty-three (forty-six per cent.), varying from six to twenty-five pounds. Disability to follow occupation in forty-nine (ninety-eight per cent.), which varied from the complete disability of a bed-ridden invalid to the partial disability of continuous discomfort with recurring exacerbations of symptoms which caused temporary complete disability. In thirty-seven (seventy-four per cent.) the disability was estimated at fifty per cent. or more, and in twenty-five (fifty per cent.) almost total disability existed. Mental inertia, lack of concentration, lack of initiative, lack of nervous stamina, varying in degree in different individuals. Constant depression. A sense of exhaustion and somnolence in the afternoon, which was prominent in many of the cases. Mental aberration of mild degree in two (four per cent.). Oral infection was present in ten (twenty per cent.). Epileptic attacks in three (six per cent.) and "fainting spells" in one (petit mal?). Typical biliary colic in two (four per cent.) followed by jaundice in one (two per cent.). There were no stones in either gall-bladder. In each case the cystic duct was distorted and kinked by a part of the membrane.

No temperature except where some complication was present.

In the hepato-duodenal group, the predominant symptoms are pain, nausea and vomiting, gradual loss of weight and stamina. The pain is in the epigastrium and when the gastric musculature is in good condition the pain is colicky and severe owing to the strong peristalsis necessary to push by the obstruction. Some stomachs hypertrophy in overcoming the obstruction and then the pain is very severe. This pain usually starts from half an hour to an hour and a half after eating, is often accompanied by sour eructations, and, often, vomiting alone gives relief. After a time the majority of stomachs fail to compensate for the obstruction, lose tone, dilate, descend toward the pelvis and crowd over to the right flank. It is my conviction that

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by this mechanism and sequence of events a large proportion of "fish-hook or ptosed stomachs" are caused, especially since operative relief from the obstruction is followed by rapid improvement in the position and size of the stomach. When the stomach is dilated and ptosed there is dull, steady discomfort, sense of fullness, dragging, fermentation, anorexia, pyrosis and debility. Many of this group have complained of a sensation as if something were pulling downward in the epigastrium, causing a sickening pain. This can be relieved by postural treatment.

The clinical history and findings in all this group are so like those of ulcer that they are difficult to differentiate; however, they fail to furnish evidence that would clinch the diagnosis of ulcer. Many such cases have been explored because of supposed ulcer or biliary calculi. No ulcer and no calculi have been found and the wound has been closed without paying any attention to the membranes. The symptoms have continued.

In the duodeno-jejunal angle group the symptoms are at first quite similar since the obstruction is only slightly further along. However, the pain is just above the umbilicus, vomiting is more frequent, and the vomitus contains bile more frequently and in considerable quantity, as the pylorus is usually dilated from the back pressure. The dilated duodenum can be made out by the method of Hayes. Perhaps the outstanding feature of this group is the great depression, both physical and mental, which is present. They are the most forlorn members of the whole larger group, and yet they respond to proper operation even more quickly than the others.

In the pericolic group, pain and distention in the right side of the abdomen, constipation and the general symptoms usually grouped under the term auto-intoxication, dominate the clinical picture.

Physical examination in the early stages may frequently give but little conclusive information. Many of these patients for a long time are well nourished, even fat; their color is good most of the time and they appear to be in good health. Their chief complaints are of pain, flatulence, constipation, and easy fatigability, which at first occur in cycles, with varying intervals of relief. As their disturbances become more frequent and persistent, and they limit the dietary more rigidly in the hope of relieving their discomfort, they lose weight; they become sallow and pasty; their general health depreciates; and they become chronic invalids, who are frequently classed as hypochondriacs and avoided by the profession.

In only ten per cent. of the group presented was there definite focal infection in the mouth or tonsils, and the elimination of these caused no marked and lasting improvement. Examination of the heart, lungs and nervous system gives evidence either of normal conditions or of complications irrelevant from the standpoint of etiology.

Repeated examinations of the abdomen, over a considerable period of time, may show nothing abnormal beyond flatulence, and possibly moderate gastric dilation and ptosis. Examination of the gastric contents shows variation in secretions, retention (absent or present), according to the

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progress of the trouble, no blood, nor any other evidence which might not be accounted for by a so-called functional disturbance.

Examination of the stools shows nothing of significance beyond variations in bacterial flora; mucus, when colitis (a frequent complication) is present; no blood, or other diagnostic evidence. Moreover, the various food elements usually come through pretty well digested.

After the pathology has progressed sufficiently, certain local signs are likely to appear.

With hepato-duodenal membranes there appears a tender area localized in the mid-epigastrium, sometimes extending over to the gall-bladder. The majority show considerable dilation and ptosis of the stomach with associated physical signs.

With obstruction at the duodeno-jejunal angle, there is usually localized tenderness about 2 or 3 cm. above and to the left of the umbilicus. The duodenum is dilated and this dilation can often be made out by the method described by Hayes. There is secondary dilation of the pylorus and stomach.

With obstruction of the first portion of the colon there appears distention and tenderness in the right lower quadrant (often extending up to the border of the ribs) and, eventually, well localized tenderness over the appendix. At this stage many an appendix has been removed on the basis of a latent chronic appendicitis, causing "reflex digestive disturbances," whatever they may be.

In the great majority of these cases there has never been a frank acute appendicitis, but the appendix, so to speak, has slipped into the clinical picture very insidiously. At some one of many examinations its characteristic localized tenderness is present. Appendectomy in this group fails to give definite symptomatic relief.

"Anomalous membranes" are present in from fifteen to twenty per cent. of people.

Appendectomy for so-called chronic appendicitis, according to Gibson and others, fails to cause symptomatic cure in about twenty per cent. of cases.

These three facts taken together lead to obvious and interesting conclusions.

While the clinical history and the findings on physical examination give results which seem too indefinite to warrant a precise diagnosis, nevertheless, experience with this group will soon enable one to make a fairly accurate estimate of the conditions within a given abdomen.

The one most necessary item for correct diagnosis is a good barium series of the gastro-intestinal tract, correctly interpreted. It has been a not infrequent experience that the X-ray report has been "negative" in cases where operation has shown these anomalous membranes to be present and causing their characteristic disturbances. A review of the barium series in these cases, preceding operation, also shows features which are characteristic. Many reports merely state that "there is no evidence of ulcer" and go into no

further detail. Therefore, one must always look over the series personally in order to do justice to his patient.

Characteristic features shown in the plates of a well-developed hepato-duodenal band are as follows:

Usually the apex of the duodenum (the junction of the first and second parts) is held rather high. Sometimes as high as the lower border of dorsal xii, in the prone position, and the lower border of lumbar i, in the erect position. More often in the same relative positions to lumbar i and ii. In the majority of cases there is distinct dilation and ptosis of the stomach; the greater curvature frequently lying below the pelvic brim.

Another characteristic feature is for the pyloric end of the stomach to be well over to the right of the mid-line, and then for the pyloric antrum, pylorus and first part of duodenum to be turned upward and inward to the vertebral column. This makes the typical "fish-hook" type of stomach. It is also characteristic that the "cap" is rarely well filled out. It is frequently elongated from the downward drag of the ptosed stomach, and may be rather irregular in outline from the influence of the pressure or distortion caused by the attached membrane.

Another characteristic feature is the sharp angulation at the junction between the first and second portions of duodenum. The second portion is frequently compressed by the under surface of the liver and shows as a narrow shadow with a straight upper edge running obliquely downward to the right. Under the fluoroscope the apex of the duodenum is more fixed to manipulation than usual and there is frequently marked tenderness to pressure at this point. As a rule there is no deformity of the cap which is sufficiently definite in repeated pictures to warrant the diagnosis of ulcer.

Peristaltic activity of the stomach varies greatly with the individual case. In those cases with very active peristalsis the stomach is not so likely to be dilated and is apt to have the so-called "cow-horn" shape. It does not reach much beyond the mid-line. These are the unusual cases previously noted and are apt to have excessive pain. The majority, however, have dilatation of varying degree depending on the degree of obstruction, and the greater the dilatation the less vigorous is the peristalsis and the more is the degree of retention. In aggravated cases the retention may be considerable even after twenty-four hours. Where the membrane causes only slight obstruction, the emptying time of the stomach is short, and there is but little dilatation.

In obstructions at the duodeno-jejunal angle evidence is obtained chiefly by fluoroscopy. The barium gets into the duodenum readily, but "puddles" in the dependent portion of the duodenum (second and third portions). There it can be seen to approach the angle and then to be pushed backward toward the pylorus and so to oscillate back and forth with the duodenum, obviously writhing in the attempt to push it along and succeeding after several attempts. Oftentimes in these cases the pictures will show the dependent portion of the duodenum to be considerably dilated, but this evidence is

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not always present on the plates. In addition to distention and obstruction in the duodenum, back pressure frequently causes dilation of the pyloric ring with subsequent dilation and ptosis of the stomach.

With the pericolic membrane a characteristic feature is relatively high fixation of the hepatic flexure. Often a comparison of the gastric with the colonic pictures will show the hepatic flexure very closely related, in its position, to the fixed duodenal apex and often the hepatic flexure does not vary its position much between the prone and erect positions; *i.e.*, showing pretty definite fixation.

In addition to the high fixation of the flexure there is often a sharp angulation, the beginning transverse colon running down in contact with the upper ascending colon. There can also be seen, very frequently, definite constriction of the barium shadow at, or near, the flexure. Between this and the cæcum the large intestine is usually dilated and this dilatation increases downward to the cæcum. Where there are several transverse, thickened bands in the pericolic membrane, the outline of the cæcum and the ascending colon will be distorted. In many of the pictures taken after the barium enema incompetency of the ileocæcal valve is evident. There is also, nearly always, a definite stasis in the cæcum and the ascending colon which may persist for twenty-four, forty-eight, or even a greater number of hours. The "club-shaped" cæcum and ascending colon is characteristic. In the majority of these cases, if they have escaped appendectomy, the appendix receives the barium early and retains it throughout the examination. Usually during a fluoroscopic examination there will be found marked tenderness over the appendix, over the hepatic flexure, and often over the intervening colon.

With the history, symptoms and physical findings previously noted, and the group of pictures showing these characteristics, one may be reasonably sure of finding one or more of these anomalous membranes causing disturbance. When the diagnosis is reasonably assured, treatment can be carried out on definite lines.

Primarily, every case in these groups should be in the care of a competent internist over a long period of time. Many of them, by means of a medical régime, logically adapted to the individual case, can be made about as comfortable as the average human being. It has been repeatedly observed that individuals who suffer much under their usual conditions, will be almost entirely free from their symptoms during a holiday in the country or woods where they can lead an out-of-door life, and be free from their usual cares and worries. This, to my mind, represents a rebalancing of the opposing factors previously tabulated (page 19). Return to the ordinary duties of life is followed by a tendency to again upset the balance. In the bad cases the relief during the holiday is less complete and the later relapse is very rapid.

When, in spite of good medical care during months or years, in spite of periods of improvement, there is a general tendency for the symptoms to become more continuous and severe, with corresponding disability, relief by surgical means is indicated. The cases in this series have been treated

on these principles with two resulting advantages; no unnecessary operations have been done; and, inasmuch as the same medical men have followed their cases for long periods, both before and after operation, the interpretation of results is not biased by a one-man surgical opinion. Because of the length of this paper no review of the various methods of surgical attack will be attempted, but merely a statement made of the methods used in this group, with the results that have been obtained.

*The Incision.*—With one or two exceptions the incision has been a transverse right rectus, placed from 1 to 3 cm. above the level of the umbilicus, according to the patient's conformation. It may be extended outward, splitting the flank muscles, or it may be enlarged inward by splitting the anterior and posterior sheaths of the left rectus and then retracting that muscle to the left. This incision, discussed by Moschcowitz years ago, has marked advantages, both immediate and remote, and some slight immediate disadvantages.

*Advantages.*—1. *Immediate*: There is perfect exposure, with very little retraction, of the chief focus of trouble; *i.e.*, the right upper quadrant, giving ready access to the liver, gall-bladder, pylorus, duodenum, head of pancreas, hepatic flexure and transverse colon. With great ease the ascending colon and cæcum can be explored, especially the outer gutter, so that pericolic membranes can be readily identified and attended to, and the cæcum and appendix (if still present) can be brought into the wound for convenient removal of the appendix. The duodeno-jejunal angle and dependent duodenum can be seen and manipulated, as necessary, through the inner end of the wound after the omentum and transverse colon have been withdrawn and protected in hot wrappings. By proper retraction and illumination all these structures can be seen as well as felt. The omental adhesions to previous vertical scars can be freed with the minimum traumatism. In addition, the inserted hand can palpate the kidneys, fundus of the stomach, spleen, splenic flexure, descending colon and pelvic organs. With a little care there need be no damage to the muscular innervation so that healing both immediate and remote is favored.

2. *Remote*: The wound heals with a thin, transverse line scar which shows almost no tendency to spread. It adds merely another "linea transversa" to the rectus which is not damaged thereby. Except in a few unfortunate cases of wound infection there seems to be no tendency to secondary hernia. Such adhesions as occur, during healing, between omentum and the scar are in a transverse line at about the level of transverse colon and, therefore, are so situated as to cause no interference with the digestive tube. Indeed, not many years ago, suturing the omentum transversely to the anterior abdominal wall, in order to make a shelf for the stomach, had quite a vogue in the surgical treatment of gastroptosis, and there were many reports of symptomatic cure following this procedure. The adhesions following laparotomies by vertical incision, as seen in certain ones of this series, cause much

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more tenderness about the scar, cause more definite symptomatology, and on exploration often show marked distortion and compression of the colon.

*The Disadvantages.*—1. It takes more time both to make and to close the wound, but not so much more as to constitute a serious disadvantage. 2. There is a tendency for the cut ends of the rectus to ooze after closure, and occasionally there will be a late discharge (twelve to twenty days after operation) of bloody serum from some portion of the wound. This, as a rule, is sterile and delays wound healing only slightly. Occasionally a staphylococcus is present and there is additional delay. Two post-operative hernias only occurred in this series and followed such an infection.

When the peritoneum is divided in the average case, the hepatic flexure appears at the outer angle of the wound and the greater curvature of the stomach (usually pyloric antrum) fills the remainder and major portion, showing that stomach extends far below and much to the right side of where it belongs. Exploration usually shows a sharp bend backward in the pyloric antrum with the pylorus and first portion of duodenum running backward, upward and inward to the duodenal apex, which is firmly moored to the cystic duct by one part of the membrane as previously described.

By retracting the stomach downward and to the left, the hepatic flexure downward, and the liver and gall-bladder upward and to the right, the hepato-duodenal membrane and its accessory variations can be clearly demonstrated. Without this retraction the membrane might escape notice, since the position on the operating table causes the viscera to slide upward and so causes relaxation of the membrane. Also this retraction is essential to indicate the mechanical disturbance caused by the membrane when the patient is in the vertical position. When the membrane is exposed and put on the stretch, it is divided by scissors, parallel to and a little below the gall-bladder. The incision is continued through the anterior layer of the gastro-hepatic omentum a sufficient distance to permit mobilization downward and forward of the duodenum and pylorus. Usually the membrane contains no vessels of significance and section is bloodless. Just above the pylorus where there are often vascular bands, it may be necessary to divide between double ligatures to get sufficient mobilization. The raw surfaces thus exposed are covered in by a continuous catgut Lembert suture of the peritoneal edges, to minimize the post-operative adhesions. The final result in the average case brings the apex of the duodenum forward and downward to lie near the fundus of the gall-bladder (forward 6 to 10 cm. and downward 4 to 8 cm.), so that the axis of stomach, pylorus and duodenum form an easy, natural curve instead of the elongated, angulated line previously present. The distortion, kinking and compression disappear under the eye. When gall-stones or cholecystitis are present, cholecystectomy is done.

In obstructions at or near the duodeno-jejunal angle two procedures have been followed: 1. When the obstruction was obviously due to kinking, distortion and compression from membranes, a plastic operation was done to restore the normal position and mobility of the angle. 2. When the obstruc-

tion was apparently due to compression by the superior mesenteric vessels, duodeno-jejunostomy between upper jejunum and the dilated dependent duodenum (third portion or junction of second and third portions) was done. Some of these were done without dividing the layer of inferior mesocolon overlying the duodenum, but rather using it as though it were the peritoneal covering of the duodenum. In others the overlying mesocolon was divided and the duodenum somewhat mobilized for greater convenience, according to the technic described by Kellogg. Whether by chance or otherwise the group in which the mesocolon was divided were much more uncomfortable for the first few days after operation. On the other hand, this method avoids the mischance of injuring a large vein which runs obliquely upward and to the left across the third portion of duodenum, a mischance which fortunately did not occur in the other small group.

In choosing between the plastic mobilization and duodeno-jejunostomy, the results, as will be seen in a later paper in this small group of cases, indicate that the anastomosis is invariably the better procedure. Kellogg stresses this point. The anastomosis should be of generous size (4 to 5 cm.), and where the mesocolon is split, its edges should be tacked to the duodenum just as to the stomach in gastro-enterostomy.

In dealing with the pericolic membranes the guiding principle has been to cause just as little traumatism as is necessary to release the colon from kinking, compression and distortion. Therefore, thickened bands or cords have been divided (between double ligatures where vascularity demanded it) and the remaining membrane has been divided parallel to the outer side of the gut. The gut expands at once so as to separate the divided ends and edges from 5 to 7 cm. Inasmuch as the true peritoneal coat of the gut is usually not adherent to the membrane along the outer wall of the colon, there should be no great tendency for post-operative adhesions to form between the gut and parietal peritoneum where the membrane has been divided and its edges separated. Where bands and cords have been divided between ligatures the raw stumps have been inverted by catgut sutures. Complete removal of pericolic membrane is advocated by a number of surgeons. Since these membranes are very frequently adherent to, or fused with, the true peritoneal coat along the anterior summit of the gut, this procedure has seemed to me both to waste time in the actual dissection, and to really prejudice the final outcome by necessarily causing true unperitonealized areas along the summit of the gut which would almost surely adhere to parietal peritoneum during healing.

Where the origin of the omentum has extended around the hepatic flexure and down the ascending colon, causing sharp angulation at the flexure, the omentum has been split and the two limbs of gut freed from each other. The raw edge on the left side has been turned in so as to leave the omentum free and minimize adhesions, and the right side turned backward and tacked to the inner side of ascending colon, so as to minimize recurrent deformity. When omentum has been adherent to the scars of previous

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operations, it has been carefully separated right at the parietal peritoneum. The raw stump of omentum has been turned in upon itself by catgut suture so as to try to prevent it from again adhering. Where the parietal peritoneum at the scar is denuded over only a narrow line it is often possible to fold it in by a running catgut suture and so diminish the likelihood or extent of post-operative adhesions. The appendix is always removed when present. After the abdomen has been completely explored, and such of these conditions as exist in the individual case have been cared for, the wound is closed by layer sutures, without any drainage.

From the very start frequent changes are made in the position of the patient, who within a few days can voluntarily roll about unaided and without discomfort. The first post-operative dressing is done on the tenth day and the skin and tension sutures removed. They sit up on the seventeenth day and leave the hospital a few days later. After the twelfth to the fourteenth day light abdominal massage is started and is gradually increased in vigor, special attention being given to the right upper and lower quadrants. This massage is continued for from four to six weeks, by which time the region of the scar is usually flexible and free from tenderness, and the abdomen as a whole seems normal to physical examination. The importance of this early massage has seemed increasingly evident as time goes on.

*Results.*—The immediate post-operative period was usually uneventful except for the customary discomforts. There was one subphrenic abscess without known cause. Recovery followed its evacuation. Three cases developed deep wound infection on the ninth, tenth and twelfth days. Two of them developed subsequent hernias. One was successfully repaired under local anaesthesia. One refused to have a repair. The third case did not develop hernia. One case had a slight discharge of serum from the outer angle of the wound about the tenth day. There was no delay in the final healing. This is a heavy incidence of defective wound healing. Many plausible reasons could be advanced but perhaps the plain statement of fact is best. There was one death in the series from pneumonia on the fifth day. In the remaining cases wound healing was by solid primary healing. After the first few weeks practically all of these wounds are free from tenderness to pressure. After the first few days of post-operative discomfort have passed the patients volunteer interesting facts.

Those who have had a sense of dragging from hepato-duodenal membrane state that it has disappeared; the old tendency to fulness, gas eructations and nausea have gone; real appetite, which has been absent for weeks, months or years has returned; foods can be taken with comfort which had always disagreed previously. The bowels begin to act with far less help than has been necessary for a long period, and in very many cases after the return to regular duties, no cathartics at all are necessary. Their faces lose the drawn, haggard, worried expression so common to the group, and the sallow, pasty complexion begins to clear up. Many of them state that the sense of mental depression and lack of power to concentrate which has

prevented efficiency has disappeared within a very short period. They gain in weight (five to thirty pounds within the first six months) and their strength and endurance are greatly increased.

In general terms, the longer the duration of the disabling symptoms preceding operation the slower is the rate of recovery. This is especially true where so-called auto-toxæmia has been present. Also, the older the patient, the less prompt and complete is the recovery likely to be, although there are many exceptions. Where colitis and perihepatitis, one or both, are present as complications, the recovery is slower, more irregular and less complete.

Along with the improved general condition there are corresponding signs of improvement on examination of the abdomen. The stomach rapidly diminishes in size to more nearly its normal location, losing a large part of its ptosis and enlargement to the right of the median line. The pain, distension and tenderness localized in the right side of the abdomen, especially the lower quadrant (in the cases of pericolic membrane), disappear within a few weeks.

In five of this present series obstruction was present at, or near, the duodeno-jejunal angle. In four of them relief was attempted by plastic work instead of by duodeno-jejunostomy. While they have shown definite improvement, the result has not been nearly so satisfactory as in a group, later to be published, where the anastomosis was done. In the fifth case the anastomosis was done and much improvement occurred, but other non-digestive troubles have prevented a real recovery of health and strength.

In only one of the group of fifty was a post-operative series of pictures obtained (about eleven months). These showed the stomach smaller and more vigorous, the pylorus definitely lower, and the axis of the cap slanted almost horizontally to the right as contrasted to an almost vertical axis before operation. Also the colon showed no stasis, and the dilatation of cæcum had disappeared. She no longer suffered from constipation. Some three years later the abdomen was opened again. The pylorus and beginning duodenum were suspended from the anterior edge of the right lobe of the liver by a thin fold of adhesions about 4 cm. long, which in no way distorted or compressed their lumen. They were visibly anterior to their position before the first operation by 10 cm. and at a lower level by 5 cm. This one case proves the possibility of permanently changing the position of the stomach outlet and also the direction of its axis with freedom from recurrence of kinks or compression.

Tabulating the results with regard to symptomatic cure furnishes interesting data. The terms "cured," "much improved," "improved," "unimproved," "died," have been used. "Cured" is applied only to those cases who are perfectly free from all digestive discomforts, restrictions in diet, constipation, etc., and in whom there has been full return of nervous and physical energy and capacity to do their work. "Much improved" has been applied to those who have returned almost to normal, but who still

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have slight disturbances of digestion of one sort or another, or some remaining impairment of vigor. At least nine of the twenty-six so tabulated might fairly have been classed as cured, since they are as well as the average person, but they have slight disturbances and so were placed in this second best group. "Improved" includes those who were definitely benefited but were not able to resume their full duties in life.

This table is made up on the basis of written reports from the patients in answer to questionnaires. The time of the latest report after operation is specified in the abstract of each individual history. These times have varied from three months to seven and one-quarter years. Of the sixteen cured, fourteen were followed from two and one-half to seven and one-quarter years. Of the twenty-six much improved, eighteen were followed from two and one-half to four and one-third years, sufficient time in each group to get a fair estimate of end results.

It will be seen that the only "cures" occurred in the upper two groups, and that the percentages are fairly high. If the "much improved," who were

		Cured	Much Improved	Improved	Unimproved	Died
1.	30 Hep.-Duod. and Pericolic...	11 (36%)	*16 (53%)	1 (3%)	1 (3%)	1
2.	13 Hep.-Duod. and H. D.-colic.	5 (38.4)	*6 (46)	0	2 (15.4)	
3.	3 Hep.-Duod., Duod.-Jej. and Pericolic.....	0	2 (66%)	1 (33%)		
4.	1 Duod.-Jej. and Pericolic.....	0		1		
5.	1 Duod.-Jej. and Hep. Duod.....	0		1		
6.	2 Pericolic.....	0		1		
	50	16 (32%)	26 (52%)	4 (8%)	3 (6%)	1 (2%)

1. \*9 practically cured.

2. \*1 practically cured.

3. \*1 practically cured.

practically all returned to full duty, are admitted as qualified "cures," the percentage of highly satisfactory results in the first two groups would reach ninety per cent. and eighty-four and four-tenths per cent., respectively. In similar manner the cures in the whole group were thirty-two per cent.; or adding the much improved, who were all back at duty and nearly well, one would get eighty-four per cent. highly satisfactory results. In the remaining four small groups in which no "cure" was obtained, it will be noticed that disturbance about the duodeno-jejunal angle was present in three groups, and in all but one (Case, No. XLIX) of these cases plastic work was used to relieve the obstruction rather than duodeno-jejunostomy.

Inasmuch as both hepato-duodenal and pericolic membranes were present in both of the upper groups in which cures were obtained in high percentage, it would seem that the duodeno-jejunal angle complication and its method of treatment were responsible for the relatively poor results in groups 3, 4 and 5. This deduction is borne out by the much better results obtained in a small group to be published in a later series in which duodeno-jejunostomy was the method used. This confirms the deductions reached by Kellogg, previously published in the series reported by him. In most of these cases

which were only moderately improved, or were unimproved, there were complicating factors other than the membranes themselves which helped to prevent the attainment of satisfactory results. (See case histories.)

SUMMARY

1. Anomalous membranes are present in from fifteen to twenty per cent. of new-born infants.
2. They result from atypical peritoneal fusion during fetal life. Many of them are probably modified by later pathological changes due to continued traction, irritation, or low-grade inflammation.
3. They occur in the hepato-duodenal region, at the duodeno-jejunal angle, and about the cæcum, ascending colon, hepatic flexure and beginning transverse colon.
4. Two or more of these regions are involved in the majority of individual cases. Groups of cases illustrating the results of treatment of the membranes found in the individual locations have been published by various men. Hepato-duodenal group by Harris; duodeno-jejunal groups by Kellogg; and pericolic group (Jackson's membrane) by Jackson, but sufficient emphasis seems not to have been put upon the fact that two or more of these lesions exist in the majority of individuals who fall within the whole large group.
5. They cause mechanical disturbances, fixation, angulation, compression and torsion of the digestive tract resulting in partial, continuous and often increasing obstruction. This, in turn, frequently causes dilation proximal to the obstruction.
6. Symptoms result when the obstruction becomes greater than the peristaltic efficiency can easily overcome. This balance may be gradually lost over a long period of time, with resulting slowly increasing symptomatology. It may be suddenly lost as the result of a prostrating injury or illness, the obstruction remaining constant while the viscus, becoming atonic, is no longer competent to overcome it. Sometimes the viscus regains its relative power and the symptoms improve. Often the viscus can never overcome the handicap and symptoms are continuous and progressive.
7. For a long time it was thought that these cases developed symptomatology only after twenty years or more of age. The investigations of Kerley in infants and children suffering from malnutrition, cyclic vomiting, recurrent acidosis, etc., show that abdominal examination and studies of the barium gastro-intestinal series give precisely the same findings as do the older cases in which operation has demonstrated the lesions, and caused cure in a high percentage of cases. This would indicate that symptoms appear in definite form at any period of life when the balance of peristaltic efficiency against the partial obstruction is lost.
8. The symptomatology consists of: Digestive disturbances previously described; general nutritional disturbances; nervous debility, usually termed neurasthenia (and occasionally mild psychosis). At some period the appen

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dix is likely to become tender to pressure, is assumed to cause the symptomatology by "reflex action," whatever that may be, and is removed, with failure to cause improvement.

9. There are usually tender spots in the mid-epigastrium, over the appendix, over cæcum and ascending colon, and over the duodeno-jejunal angle, depending upon the presence of the various lesions. There is varying dilation and ptosis of the stomach, and varying dilation of cæcum and ascending colon. In marked obstruction at the duodeno-jejunal angle the dilated duodenum can be made out.

10. Examination of gastric contents and stools gives no evidence of value as a rule.

11. The most important element of evidence is found in the barium gastrointestinal series. It must be a good series, with sufficiently frequent plates. The plates must be read by one experienced in these cases. It is common to receive typewritten reports that the plates are "negative" or that the digestive tract is "normal" when inspection of the plates shows characteristic evidence to be on the plates. Fluoroscopy should be done by one experienced in these cases, especially to determine the presence of obstruction at the duodeno-jejunal angle, indicated by marked distention of dependent duodenum, with writhing and rushing of the contents back and forth. The pictures are not quite so conclusive, and on the operating table the duodenum may be empty and the condition not so obvious.

The plates are likely to show:

Hepato-duodenal Membrane: The stomach dilated, ptosed, with varying peristaltic activity. With or without retention. The apex of duodenum fixed high, sharply angulated and showing little mobility. The cap is often deformed but not in the way characteristic of ulcer. The second part of duodenum is likely to be compressed and narrowed.

Duodeno-jejunal Angle Obstruction: Dependent duodenum, if dilated, may or may not show definitely on the plates.

Pericolic Membrane: The hepatic flexure shows high fixation (often near the duodenal apex), angulation, and often transverse colon descends in contact with ascending colon. Cæcum and ascending colon are dilated. Ascending colon often showing constriction at about its middle. Appendix, if still present, usually retains the barium for long periods. Ileocæcal valve is often incompetent.

12. Treatment: (a) Prolonged medical. (b) Surgical. Best incision is "transverse right rectus," as it gives best exposure of the whole field, and post-operative adhesions are in least troublesome situation. (c) Post-operative. Abdominal massage. Medical supervision of diet and general hygiene, etc.

Results very satisfactory, as a whole. (See table, page 531.)

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NOTE.—Grateful acknowledgment is made: to Doctors Meara, Goodridge, Niles, Williams, and Painter for their interested collaboration in working out the

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problems presented in the paper and for following up, before and after operation, these patients from the medical standpoint.

To Dr. John B. Walker for the privilege of assisting at operation on the first case of this type in the author's experience, and for the privilege of including this case in the group herewith published.

To Dr. H. M. Imboden for his collaboration in working out the X-ray picture interpretations in this type of cases. To Dr. L. T. Le Wald for assistance in the X-ray problems.

In giving the case abstracts all non-essentials have been avoided in order to save time and space. Ether anæsthesia was used in each case. The term T. R. R. equals "transverse right rectus." Surgical procedure is termed: "Mobilization, duodenum, mobilization, colon," etc.

In every case these terms indicate the treatment of the corresponding membranes according to description of the technic in the body of the paper. Also in nearly every one of the cases there has been prolonged medical treatment preceding consideration of operation. In some few cases where the condition was obviously unpromising from the medical standpoint, this preliminary treatment was not undertaken.

One of the things that experience has taught the group interested, is that an *early* barium series is very likely to clear up the diagnosis and make treatment far more definite and logical. It is interesting to note in these cases that the longer the period which has elapsed between operation and report, the greater improvement seems to have occurred in the majority of cases. In the few unfortunates who have been classed as "unimproved" time has seemed to make no difference. The latest reports coming in have necessitated revising the group of results because of the reports being much better than those received one and two years before. This is a very satisfactory feature because the one fear has been that after a long period of time post-operative adhesions might cause a recurrence of the old disturbances. This seems not to be the case.

The case histories have not been given in the order of their numbers but have been grouped according to the combinations of membranes found, so that the similar cases will be all together for the convenience of the reader in working out symptomatology, procedure and results. Cases XLVI, XLVIII and L have been included in the group of hepato-duodenal-pericolic membrane group, because the angulation at duodenal cap was only a variation of that in the true hepato-duodenal membrane type.

*Group No. 1.*—Hepato-duodenal membrane: Case Nos. I, II, III, X, XI, XII, XIV, XIX, XXVIII, XXIX, XXX, XLIV, XLVII.

*Group No. 2.*—Hepato-duodenal membrane and pericolic membrane: Case Nos. IV, V, VI, VII, VIII, IX, XIII, XV, XVI, XVII, XVIII, XX, XXII, XXIII, XXIV, XXV, XXVII, XXXII, XXXIII, XXXIV, XXXV, XXXVII, XXXIX, XL, XLI, XLIII, XLV, XLVI, XLVIII, L.

*Group No. 3.*—Hepato-duodenal membrane and duodeno-jejunal membrane: Case No. XXI.

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*Group No. 4.*—Duodeno-jejunal membrane, pericolic membrane: Case No. XXXI.

*Group No. 5.*—Pericolic membrane: Case No. XXXVI.

*Group No. 6.*—Hepato-duodenal membrane, duodeno-jejunal membrane, pericolic membrane: Case Nos. XXXVIII, XLII, XLIX.

**CASE I, C. R., F.** Twenty-seven years. Previous operations: appendectomy and exploration of gall-bladder. Duration of symptoms, always. Nausea and vomiting since childhood. No pain until 1908 when she had a sudden attack in the lower right side with nausea, vomiting and fever. Recurrences until March, 1909, when a chronic catarrhal appendix was removed. Since this operation there had been pain between the umbilicus and gall-bladder which was increased by exercising, by bending backward and by fatigue. Nausea and vomiting became worse. Gall-bladder exploration March, 1914. No stones or inflammation. Wound closed. Symptoms grew worse steadily. From August 1, 1914, to September 23, 1914, she was confined to bed most of the time.

P. Ex.: She is a large, well nourished, rather nervous woman. Weight 147 pounds. Scars of two operations, upper scar quite tender. General examination otherwise negative.

X-ray series: Showed "many apparent adhesions between the stomach, pylorus and gall-bladder." Pre-operative diagnosis: Hepato-duodenal membrane.

Operation: 9-23-14. Incision: vertical. Findings: Stomach: somewhat enlarged. Duodenum: apex, held high and kinked by definite hepato-duodenal membrane. Procedure: Membrane divided; edges sutured. Convalescence: uneventful.

Result: Pain, nausea and vomiting were relieved at once, and have never since recurred. Cured, seven years.

(For the privilege of including this case, which was the first one I had ever seen, and for the privilege of assisting at the last operation, I wish to express my acknowledgment to Dr. John B. Walker. It was perhaps the most dramatic case in the whole series.)

**CASE II, L. S., F.** Forty-eight years. Duration of symptoms: seventeen years. Nausea and vomiting; frequent. Pain, constant. Flatulence and constipation with considerable loss of weight. Much headache, exhaustion, almost complete disability.

P. Ex.: Pale, sallow woman weighing 140 pounds. Very neurasthenic. Examination of chest, urine, stools, gastric contents: negative. Abdomen: distended. Tender spots were present over appendix, over left iliac fossa and sigmoid which was spastic, and just above and to the right of the umbilicus, and just beneath the free border of the right ribs.

X-ray series: Duodenum: fixed high. Stomach: fish-hook type, six hours retention, cap slightly deformed. Stasis in ascending colon. Appendix: visualized throughout. Marked gastrophtosis in the erect posture. No gall-stones were seen. Pre-operative diagnosis: Hepato-duodenal membrane. Chronic appendicitis.

Operation: 5-15-15. Incision: T. R. R. Findings: Stomach: enlarged but showed no sign of ulcer. Duodenum: fixed to gall-bladder and liver and was markedly compressed by a hepato-duodenal membrane extending half way to the fundus of the gall-bladder and passing down across the duodenum to beginning transverse colon. Liver: showed marked perihepatitis. A small segment removed for the microscope showed normal liver cells but much thickened capsule. Appendix: atrophic. Procedure: membrane divided. Appendectomy. Convalescence: uneventful.

Result: 4 months after operation she had gained 14 pounds, felt stronger and better in every way than for years. Moved away from city and is untraceable. Much improved—four months, then lost.

CASE III, G. A., F. Thirty-one years. Previous operation: ovariotomy eight years previous. Abdominal pain for years. Subject to regurgitation of sour stomach contents, much flatulence. Of late has had much pain in right iliac fossa. Has always been strong and able to work.

P. Ex.: Large, well nourished woman showing tender spots in mid-epigastrium, just below and to the right of umbilicus, and over the appendix. Examination of gastric contents and stool: negative.

X-ray series: Shows high fixation of duodenum with angulation. Cap shows constant deformity. Stomach: markedly dilated and ptosed. Empty at six hours. Barium in appendix for ninety-six hours. Pre-operative diagnosis: Hepato-duodenal membrane. Chronic appendicitis.

Operation: 3-14-16. Incision: vertical right rectus. Findings: Stomach: very much enlarged and ptosed. Distended enormously with gas two times during operation so that a tube had to be inserted and left. Duodenum: fixed high beneath the liver by a thick membrane running from the middle of gall-bladder and cystic duct to duodenum, pylorus and colon, allowing no mobility to apex of duodenum. Appendix: distended, thickened and rigid. Procedure: Gastro-enterostomy; because of thickness and vascularity of membrane, making mobilization too difficult. Appendix resected, stump inverted. Pathological report: Appendix shows involutionary changes only. Convalescence: Uneventful.

Result: Digestion normal, has to avoid greasy foods. Slight constipation. General health and comfort much better. Much improved, one year, nine months.

CASE X, C. G. H., F. Forty-seven years. Symptoms: biliary attacks since childhood. At thirty-one years of age had an abdominal injury. One year later had pain in iliac fossa with fever and nausea. Thereafter, frequent abdominal pain. Constipation became more marked, worse for the last two years. During these two years much nausea, headache and lassitude, such that she was almost completely disabled.

P. Ex.: Small, fairly well nourished, sallow, neurasthenic. Examination of gastric contents, stool, urine: negative. Abdomen: somewhat distended; showed tenderness just below xiphoid and over cæcum.

X-ray series: Showed high fixation of duodenum with limited mobility. Stomach: enlarged and ptosed. Cæcum and ascending colon: showed retention with dilation. Shadows in gall-bladder region were interpreted as stones. Pre-operative Diagnosis: Hepato-duodenal membrane. Biliary calculi. Peritoneal membrane.

Operation: 3-24-17. Incision: T. R. R. Findings: Gall-bladder: normal. Liver: showed hepatitis and perihepatitis. Small wedge removed. From the cystic duct and proximal gall-bladder was a membrane running across the duodenum, pylorus, pyloric antrum to transverse colon, causing distortion and kinking of the stomach and colon. Stomach: enlarged and distended with gas. Pushed well over into the right flank then curved back, inward and upward, showing a kink in the pyloric antrum. Appendix: ran up the outer side of cæcum, firmly adherent throughout. From its tip a firm band of connective tissue ran upward and inward to anterior summit of colon. This caused cæcum and colon to rotate and buckle. Omentum: came around the hepatic flexure and down the ascending colon, attached to the front of the colon. This caused rotation inward of the colon so that the ileocaecal valve lay directly posterior instead of to the inner side of cæcum. Procedure: Hepato-duodenal band was disposed of. Appendix removed and stump inverted. Omentum cleared from cæcum and ascending colon. Pathological report: Involutionary appendix. Liver capsule;

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chronic perihepatitis. Liver cells normal. Convalescence: Uneventful. Improvement rapid.

Result: Digestion greatly improved. Very little pain. No nausea. Rarely constipated. Gained five pounds in weight and very much in well-being. Much improved, nine months, then lost.

CASE XI, E. C. H., F. Fifty years. Previous operation: gall-stones and chronic appendix at same time. Symptoms for fifteen years. Epigastric pain, constipation, flatulence, sleeplessness, nervousness and lack of strength. Following her operation there was no improvement. Symptoms became more severe until now she is disabled. She has always been fat.

P. Ex.: Short, very fat woman of good color. Examination of chest, gastric contents, stool, blood, urine and pelvic viscera: negative. Finger joints show chronic arthritis. Abdomen: prominent, very fat wall, shows long right rectus scar. Great tenderness all along scar, especially at upper end. Also marked tenderness midline just below the xiphoid.

X-ray series: Show high fixation and angulation of duodenum both erect and prone positions. Pre-operative Diagnosis: Hepato-duodenal membrane. Adhesions.

Operation: 6-19-17. Incision: T. R. R. Findings: widespread adhesions everywhere; between omentum, anterior parietal peritoneum and edge of liver nearly to median line. When these adhesions were freed the stomach was exposed. The upper anterior surface of pyloric antrum was adherent to the bed of the gall-bladder, which had been removed. Running from the under surface of liver across front of stomach was a band of connective tissue 2 cm. wide, quite vascular, causing kinking and compression almost like an hour-glass. After the stomach was dissected from the gall-bladder bed a perfectly typical hepato-duodenal membrane 1 cm. long, absolutely inelastic, was found holding the duodenum high and causing compression and angulation. Procedure: The bands were divided and the stomach mobilized. Convalescence: Slow and unsatisfactory. On the seventh day there was a slight suppuration at the inner angle of the wound. On the twenty-first day she sat up. On the twenty-second day had pelvic pain. Urine showed culture staphylococcus albus. Home on the thirty-fifth day.

Result: She was unwilling to coöperate and for two years her report was such that she was classified as a complete failure. Failure, four years, six months. (Later report.)

CASE XII, M. S., F. Twenty years. Previous operation: Appendix removed two years ago. For four years had periodic headaches which were becoming steadily worse. Nausea and persistent vomiting with abdominal pain. After removal of the appendix no relief of symptoms but dull, steady pain in the right side followed. There is no constipation, no loss of weight. Pain is worse on standing; is slightly relieved by crouching and by abdominal belt. She loses about thirty per cent. of her time from her work.

P. Ex.: She is of small size, well nourished and of good color. Examination is negative with regard to everything except the abdomen, which shows a two-inch appendix scar at the outer edge of the right rectus. Edges tender all about the scar. There is marked tenderness in the mid-epigastrium to the right of the middle line. There is not much gas.

X-ray series: Show high fixation and immobilization of the duodenum with marked gastropexis and colopexis. There is persistent unevenness of the cap and much elongation of first portion of duodenum. Pre-operative Diagnosis: Hepato-duodenal membrane. Adhesions—post-operative.

Operation: 7-24-17. Incision: T. R. R. Findings: Duodenum: held firmly under the cystic duct by a firm hepato-duodenal membrane running half way out to the fundus of gall-bladder. Stomach: dilated moderately. Small omental

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adhesion to the upper end of appendix scar. Procedure: Before the division of the hepato-duodenal membrane, the duodenum, which was angulated and compressed, could not be displaced downward. The fold was divided transversely and with little blunt dissection the duodenum was mobilized downward 7 cm., and was freed from kinking and compression. Adhesions and omentum were separated from appendix scar. Convalescence: Uneventful.

Result: Absolutely free of symptoms. Works one hundred per cent. of time. Cured, four years, six months.

CASE XIV, A. H. M., M. Forty-five years. Symptoms twenty-eight years. Pain in epigastrium increased by swimming, rowing, erect posture, or by anything which puts tension on the rectus muscles. The pain was almost constant and increasing in severity. Could not lie on stomach or left side. Some relief by crouching. After a time headaches, gastric pain, constipation, flatulence, nervousness, insomnia, anorexia and loss of weight became increasingly troublesome. Fourteen years after beginning of pain an exploration was made through a median, upper abdominal incision. No ulcer or gall-stones were found and the wound was closed. Symptoms became worse. There was twenty-five to thirty per cent. disability with regard to his professional work and he never worked with any comfort.

P. Ex.: Five feet eight and one-half inches high, weight 104 pounds. His frame was slight, was emaciated, pale, haggard, with the drawn face of chronic suffering. He stands and works in a slightly stooped attitude because of the relief thus afforded. Examination, except for abdomen, negative. Abdomen: shows median scar which is very tender throughout, especially to the right of its upper end. Cannot endure slightest pressure. There is increased localized tenderness just above and to the inner side of R. A. S. S. The abdominal wall is retracted and scarcely moves during respiration.

X-ray series: Show high fixation of pylorus, duodenum and hepatic flexure. There is deformity of the cap and sharp angulation of the duodenum. Slight stasis in the ascending colon. Pre-operative Diagnosis: Hepato-duodenal membrane. Peritoneal membrane. Adhesions.

Operation: 8-17-17. Incision: T. R. R. Findings: Adhesions between omentum and the old median incision. Pylorus: adherent to fundus of gall-bladder and duodenum ran backward along the gall-bladder in contact throughout its first portion. There was a firm band running from the pyloric end of lesser curvature of stomach to the edge of liver just to the left of round ligament. Stomach: moderately dilated and ptosed. Cæcum and appendix: were just beneath the right lobe of liver and ileocecal valve at postero-external relation to inverted cæcum. A peritoneal fold ran from the cæcum upward beneath and to the right of appendix to the liver edge. From the cæcum the large gut went downward and at about the middle of ascending colon turned upward to follow its normal course. Procedure: Adhesions to old scar were separated. Adhesions between stomach and liver were divided. Adhesions between pylorus, duodenum and gall-bladder divided; duodenum mobilized downward 7 cm. Appendix: removed. Cæcum: mobilized downward to its normal situation. Convalescence: Uneventful.

Result: After four and one-half years still has epigastric pain and some headache. Has no gas, no constipation. Appetite much better. Has maintained a gain of ten pounds. General health and capacity for work much increased. Much improved—four years, six months.

CASE XIX, C. S., F. Eleven years. Instrumental delivery following difficult labor. Had cyanotic attack on second day. Up to the age of seven she developed normally except for digestive disturbances. When seven she began to have attacks of petit mal. Her digestive disturbances grew worse; was subject

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to headache, nausea, vomiting and marked constipation. In spite of a good appetite and taking large quantities of food she lost considerable weight. When ten years old had her first attack of grand mal, since which there has been a number of both grand and petit mal attacks. There has been some loss of memory. When ten years old tonsils and adenoids were removed. There was temporary improvement in general health, but attacks recurred shortly afterward.

P. Ex.: Tall, fairly nourished girl, rather pale, with a pasty complexion and showing considerable acne. Examination of throat, chest, gastric contents and stools: showed nothing of moment. Abdominal examination: showed tenderness over the appendix and to the right of the median line in the mid-epigastric region. Also showed free descent of the liver on inspiration and a stomach which seemed enlarged and ptosed to percussion.

X-ray series: Showed well-marked enteroptosis. Stomach: very much dilated; marked six-hour retention; no evidence of ulcer. Duodenum: fixed high and kinked beneath the liver. Flexures of the colon were low; both below the level of iliac crest. Cæcum: was deep in the pelvis. Examination of the urinary tract and chest showed nothing abnormal. Skull: showed signs of prolonged, increased intracranial pressure. Pre-operative Diagnosis. Hepato-duodenal membrane. Chronic appendicitis.

Operation: 1-30-18. Incision: T. R. R. Findings: Duodenum: fastened high up to under surface of liver just to the left of cystic duct by a firm, fibrous band. Hepato-duodenal membrane: extended 6 cm. outward along the gall-bladder, ran across the front of duodenum to beginning transverse colon. Stomach: greatly dilated. Appendix: small and adherent to iliac fossa. Procedure: Adhesions and membrane between gall-bladder, liver and duodenum were divided and the duodenum mobilized downward about 5 cm. Appendix: freed, removed and the stump inverted, as usual. Convalescence: Uneventful. She made a perfect recovery.

Result: Three years, six months after operation all of her digestive disturbances had disappeared. She has grown rapidly in size, her color has cleared up and she has been full of energy and has made a high stand in her class at school.

Cured, three years, six months. (Her attacks of grand mal continued and exploration of the brain showed a large cyst in the right temporal sphenoidal lobe, which was evacuated.)

CASE XXVIII, T. B., F. Twenty-nine years. She was well until twenty-seven and one-half years old, when she developed a steady pain in the right hypochondrium accompanied by nausea and vomiting. There was no temperature. The attack lasted two to three hours. During the succeeding eighteen months there were about twenty-five similar attacks. During that period she also had one attack of pain lower down which ran into the urinary bladder and was accompanied by strangury. Between her frequent attacks of abdominal pain her appetite was good and her bowels rarely constipated. She was somewhat addicted to alcohol and tobacco. The remainder of her history is irrelevant.

P. Ex.: Woman of medium height but large frame and fat. Good color. Examination of chest, gastric contents, stools, etc.: negative. Abdomen: prominent, wall flabby, small omental umbilical hernia. There was no tenderness over the appendix. Some tenderness over sigmoid. Just to the right of the mid-line, opposite the eighth costal cartilage is marked tenderness over an area of 3 cm. in diameter. Percussion shows a dull note in this area. Liver: not enlarged. Kidneys: negative. Stomach: does not seem enlarged.

X-ray series: Shows one shadow somewhat definite that might indicate a gall-stone. Shows stomach somewhat enlarged and ptosed. Peristalsis seemed normal. No indication of ulcer. Emptying time four hours. Duodenum: fixed high beneath liver, and angulated. Cæcum: somewhat dilated. Appendix: held

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barium through examination. Ileocæcal valve: incompetent. Pre-operative diagnosis: Hepato-duodenal membrane. Biliary calculi. Chronic appendicitis.

Operation: 5-14-18. Incision: T. R. R. Findings: Stomach: much dilated, well over to the right side; turned backward, upward and inward to duodenum, which was firmly fixed by a broad hepato-duodenal membrane. Gall-bladder: contained numerous small stones. Appendix: showed several small fecal masses. Procedure: Gall-bladder removed; the stump of cystic duct sterilized and covered in by peritoneum. Duodenum: mobilized downward 6 cm. Appendix: removed and stump inverted. Convalescence: Uninterrupted.

Result: Has never had any digestive trouble since operation. Cured, three years.

CASE XXIX, M. M., M. Forty years. Always well until twenty-five years old. Then recurring attacks of pain every few weeks. When thirty-three acute perforative appendicitis occurred. Operation was followed by prompt healing and much improvement in digestion. Slow recovery of strength. Whenever tired or nervous old digestive attacks would recur. His bowels have been fairly regular. His weight varies from 130 to 140 pounds. No nausea or vomiting but little flatulence. Chief disturbances are attacks of pain, nervous depression and disability that goes with them.

P. Ex.: He is a medium-sized, well-nourished man. Sallow color. Examination is negative with regard to gastric contents, stools, etc., and with regard to chest and urine. Abdomen: shows scar of the appendix operation but no tenderness is associated with it. Tenderness: just to the right of the median line slightly below xiphoid. No distention or tenderness in the cæcal region. Stomach: by percussion reaches below the umbilicus and well over beyond the median line to the right side.

X-ray series: Stomach: pulled well over to the right and fixed high up beneath the liver. No deformity of stomach or duodenum. No indication of ulcer. Peristalsis is active. Slight retention at three hours. Cæcum: seems moderately enlarged.

Operation: 5-16-18. Incision: T. R. R. Findings: There was a strong, double fold of peritoneum running from the cystic duct and proximal gall-bladder downward across to duodenum and pylorus to transverse colon. This fold caused high fixation and an obvious sharp kinking of the duodenum. Stomach: pylorus on the anterior wall was irregular; wide cicatrix with much thickening of the underlying wall. The crater of the ulcer could be palpated. There was perihepatitis on the under surface of the right lobe of liver. There were omental adhesions to the old appendix scar which were not causing any apparent disturbance. Procedure: Hepato-duodenal membrane was divided and duodenum mobilized downward. Ulcer was excised and the wound closed by three layer sutures. Convalescence: Prompt and satisfactory.

Result: Since operation there have been several periods of apparent recurrence and healing of ulcer. At present, three years, seven months after operation, he is in very good condition. Has gained weight and color. Capacity for work has greatly increased. Appetite is good; no constipation. Is troubled slightly with gas. Much improved, three years, seven months.

(It is probable that the symptoms in this case were due more to the ulcer than to membrane development, but it was there and the case is included to indicate the variety.)

CASE XXX, S. M., F. Twenty-four years. Began to have digestive trouble when nine years old. One year later had gangrenous appendicitis, peritonitis and was operated upon. When eighteen years of age began to have attacks of grand mal associated with nausea and vomiting which persisted for two days after the attack, sometimes the temperature would rise to 102° F. At first the attacks

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came at four to six months apart, but gradually increased in frequency until at the age of twenty-four they occurred for two to three days in succession at intervals of two or three weeks. During the intervals her appetite was good, and the bowels somewhat constipated. She had much belching of gas and frequent epigastric pain. She was always depressed and irritable. Her periods were regular and normal.

P. Ex.: She is of medium size, well nourished, brunette, but pale, and with a pasty complexion and acne. There is excessive development of hair on the head, face and abdomen. Gastric contents, stools, urine and blood show nothing abnormal. Protein skin tests—negative. Abdomen shows the appendix scar, oblique, in the right lower quadrant. There is persistent tenderness over the cæcum which is distended with gas, most marked along the inner side of the scar. Also there is marked persistent tenderness to right of median line a little below the xiphoid. Stomach is enlarged and distended with gas.

X-ray series: High fixation of duodenal apex; deformed cap; no evidence of ulcer. Stomach: dilated, fish-hook type; slight four-hour retention; peristalsis somewhat atonic. Slight ileocecal stasis. Cæcum moderately dilated; retains barium unduly long; somewhat irregular in outline. Ascending colon seemed constricted at about its middle. Gall-bladder, sella turcica, and teeth negative. Pre-operative Diagnosis: Hepato-duodenal membrane. Adhesions.

Operation: 5-30-18. Incision: T. R. R. Three cm. above navel. Findings: Hepato-duodenal membrane 3 cm. wide, holding duodenum high, fixed and kinked at apex. Stomach: somewhat dilated; otherwise negative. Dense adhesions between appendix scar, cæcum and omentum. Cæcum moderately dilated. Right edge of omentum passed obliquely across front of ascending colon, to which it was densely adherent, to upper end of old incision; it caused marked constriction of ascending colon. Gall-bladder normal except for above membrane. Liver and kidneys normal. Uterus, infantile. Ovaries, normal. Procedure: Hepato-duodenal membrane divided, duodenum mobilized downward 5 cm. Adhesions carefully separated; damaged omentum resected and stump inverted. Convalescence: Uneventful, except for "attacks" on the twelfth, nineteenth and twentieth days. On the twenty-first day she left the hospital "feeling better than for years." Seven months later she felt free from depression, her skin was clear, her color pink. She felt perfectly well in every way. Attacks came at irregular, longer intervals, were never severe and were not followed by gastric disturbance or depression. Appetite is good; digestion is perfect, with larger quantity and variety of food than was ever before possible. Nine months after operation a barium series showed marked improvement in stomach, duodenum, cæcum and ascending colon. Not quite three years after operation she developed distress in upper abdomen; fluoroscopy showed stomach, first and second portion of duodenum in good position and freely movable; dependent duodenum (third and end of second portions) was dilated and there was evidence of obstruction at the duodeno-jejunal angle.

Operation: By another surgeon: 6-9-1921. Incision: vertical right rectus near median line. Findings: Stomach: normal. Pylorus and duodenum suspended from anterior edge of liver by flexible adhesions about 3 cm. long, allowing free mobility without kinking or obstruction. Adhesions were present between omentum and scars. No constriction of colon. Procedure: Adhesions divided. Duodeno-jejunostomy. Later information lacking. Result for two years, nine months. Perfect relief of digestive troubles.

(Examination of the original barium series shows some dilation of dependent duodenum, but at that time its significance was not generally appreciated, as it is at the present time.)

CASE XLIV, E. B. S., F. Fifty-one years. Always frail. At twelve years jaundice with much digestive distress for several weeks. Then comparatively

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well until twenty-one years, since when she has had much digestive trouble, distress and a "sense of dragging" in the upper abdomen, belching of gas, no nausea or vomiting; frequent flatulence; moderate constipation; very fickle appetite. At first these troubles came in attacks lasting for several weeks, followed by comparative relief for a few months. Gradually these attacks have become more frequent, more persistent and more severe, the distress being most in the right upper quadrant. No jaundice, no vomiting. Sense of dragging in epigastrium constant without relation to food. In last two years loss of twelve pounds, and great depreciation in strength. Very nervous. Occasional sharp headaches. Heart irregular with attacks. Almost completely disabled. No urinary disturbances. Periods began at twelve, irregular, profuse, some pain; ceased at forty-eight.

P. Ex.: Tall, slender, sallow. Skin dry and flabby. Pulse 80, regular, fair quality. Hæmoglobin, 90 per cent.; R. C., 3,190,000; B. P., 135 mm. Rough mitral systolic murmur, no decompensation. Lungs, urine, etc., negative. Abdomen: distended with gas, very tympanitic except for dull note over gall-bladder, which seems to be distended, palpable and slightly tender. Elsewhere no tenderness.

X-ray series: Stomach: marked fish-hook type; descending into true pelvis; seven-hour retention. Duodenum: apex at level of lumbar iv in erect posture; one-half vertebra higher in prone posture (fixation). No deformity suggestive of ulcer. Duodeno-jejunal angle is at level of lumbar iii, i.e., higher than apex. It is not tender and shows no obstruction. Liver shadow is unusually low, accounting for low fixation of duodenal apex. No indication of gall-stones. Cæcum inverted; and appendix, beneath liver, is segmented and tender to pressure. Some stasis in cæcum and ascending colon. Pre-operative Diagnosis: Hepato-duodenal membrane. Pericolic membrane. Chronic appendicitis.

Operation: 2-3-1919. Incision: T. R. R. just above navel. Findings: Right edge of liver just below right iliac crest. Liver and gall-bladder normal except for position; also membrane. Hepatic flexure held in contact with fundus of gall-bladder by membrane. Inverted cæcum and appendix to outer side of gall-bladder just beneath right lobe of liver, but not adherent to it, being held up by peritoneal folds fusing with peritoneum in front of right kidney. Ileocaecal valve on postero-external aspect of inverted cæcum. Pylorus and first portion of duodenum held in direct contact with gall-bladder and cystic duct by hepato-duodenal membrane which caused fixation, compression and angulation. Stomach: enlarged but showed no sign of intrinsic disease. Duodeno-jejunal angle: normal. Kidneys: normal except for increased mobility. Uterus: small. Ovaries: small and fibrotic. Procedure: Appendectomy. Mobilization of cæcum and terminal ileum to their normal site. Division of hepato-duodeno-colic membrane with mobilization of hepatic flexure; and duodenum downward 6 cm. Raw surfaces covered in. Convalescence: Uneventful.

Result: Two years, ten months: Some flatulence, occasional constipation, fine appetite; very few restrictions as to food; much improved in color; and very greatly in strength. Much improved, two years, ten months. (Practically cured.)

(Her brother-in-law states that "she is entirely made over, she was always sick, self-centred and a nuisance to everybody. She is now well, attending to her own duties, and very helpful to all those about her." She ought properly to be classed as a cure in spite of her occasional digestive discomforts.)

CASE XLVII, J. F., M. Forty years. Frequent bilious attacks as a boy. Then well as to digestion until after twenty-eighth year when he had typhoid and relapse, causing thirteen weeks' stay in bed. Since the typhoid there have been digestive disturbances, usually in long attacks with occasional short intervals

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of relief. At first the difficulty was chiefly from gas distention with only moderate pain and no constipation, and no nausea. There has been marked increase in the disturbance, especially during the last eight months, preceding operation, and increasing constipation, occasional nausea, more pain, occasional headaches, and a marked loss of energy and capacity, both mental and physical, have been added to the clinical picture. Extreme nervousness, irritability and loss of self-control have developed. He is a moderate user of tobacco and alcohol.

P. Ex.: He is a large framed, well-nourished man of good color. Heart, lungs, urine, gastric contents and stool showed nothing of moment. Abdomen: somewhat distended; tympanitic over cæcum, ascending colon and beginning transverse colon; almost flat to percussion on the left side; moderate tenderness beneath right ninth and tenth costal cartilages, and over the appendix. Otherwise negative.

X-ray series: Stomach: smaller than average; shows no sign of ulcer; peristalsis hypertonic. Duodenum: apex, erect posture, at lumbar ii, prone posture one-half vertebra higher; immovable during fluoroscopy. Terminal ileum curled upon itself behind cæcum. Appendix: visualized clearly; freely movable. Cæcum and colon: no stasis. Gall-bladder and urinary apparatus showed no calculi. Pre-operative diagnosis: Hepato-duodenal membrane. Chronic appendicitis.

Operation: 3-3-1919. Incision: T. R. R. Two cm. above navel. Findings: Stomach: smaller than normal, cow-horn type; walls somewhat hypertrophied; antrum to right of median line and curved sharply back, up and inward to. Duodenum: apex, fixed rigidly 1 cm. below cystic duct, kinked and compressed; by hepato-duodenal membrane running from proximal third of gall-bladder and cystic duct to first portion of duodenum, involving apex and running across in front, membrane rigid. Gall-bladder normal except for membrane. Liver normal except for thickened capsule on under surface right lobe. Duodeno-jejunal angle, transverse and descending colons, normal. Terminal ileum freely movable. Appendix: long, irregular; tip fibrous for 3 cm. Kidneys and pelvic contents negative. Procedure: Hepato-duodenal membrane divided. Duodenum mobilized downward 4 cm. Appendix: removed, stump inverted. Post-operative period was stormy; temperature was around 103 for the first four days; there was marked abdominal distention from the start, which was very refractory to treatment for seventy-two hours, but then diminished considerably; pulse, 130; respiration, 26; râles at right base. On the third day there was flatness up to the sixth rib posteriorly. After the fifth day the temperature descended gradually to 101; flatulence much less, pulse and respiration much less embarrassed. Tenth day sutures removed; wound free from tenderness or swelling; apparently perfect primary union. Fourteenth day: discharge from outer angle of wound; culture showed colon bacillus. Eighteenth day: temperature again 103.6 and X-ray picture indicated subphrenic abscess, which was evacuated by another surgeon, a quart of yellow, almost transparent fluid being obtained, followed by turbid fluid; culture showed colon bacillus. Convalescence: was then steady and he left the hospital on the thirty-eighth day after operation, his digestive disturbances having disappeared. Pathological report: "Atrophic appendix."

Result: Failure. Still troubled with flatulence, constipation, etc. Failure, two years, nine months.

CASE IV, T. S., M. Thirty-five years old. Absolutely well until twenty-three years old. After eating heartily he went hunting, exercised strenuously, felt epigastric pain, distention and "splashing in stomach." Thereafter, food or drinks caused same trouble, but in increasing degree. For a long time ingestion of fluids caused protrusion of epigastrum, downward dragging, headache, and tremulous weakness. Anorexia. Eats only

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two small meals per day from fear of the pain. No vomiting. Always had marked flatulence. No definite constipation. Pain is somewhat relieved by bending forward and pressing against abdomen; also by lying on left side; lying on right side causes pain. He is incapacitated about fifty per cent.

P. Ex.: Small frame, thin, but fairly muscular Japanese. Facies of constant suffering. Lungs, heart, urine: negative. Abdomen: much distended and tympanic. Stomach: dilated; down to navel; very tympanic; splashing marked; tender just above navel and increasing upward to mid-epigastrium. Cæcum and ascending colon are distended, tympanic and tender. Appendix: no localized tenderness.

X-ray series: Omitted for financial reasons. Pre-operative diagnosis: Hepato-duodenal membrane. Pericolic membrane. Appendicitis—chronic(?)

Operation: 7-15-1916. Incision: T. R. R. 4 cm. above navel. Findings: Hepato-duodeno-colic membrane, short and thick, and with an extension to quadrate lobe of liver. Duodenum: fixed high; kinked; compressed. Stomach: greatly enlarged, distended, well into right flank; doubled back on itself to reach duodenal fixation. No intrinsic gastric disease. Duodeno-jejunal angle: negative. Pericolic membrane: well developed, covering whole cæcum and ascending colon, causing compression, kinking, etc. Cæcum: dilated. Appendix: very long; irregular calibre; external to cæcum. Procedure: Hepato-duodeno-colic membrane divided; duodenum mobilized downward 7 cm. Pericolic membrane divided. Appendix removed. Convalescence: Uneventful. Pathological report: Chronic appendicitis.

Result: Four months later had gained 15 pounds, felt much better and able to work well. Nineteen months later—appetite good, could eat three meals per day; all foods; no pain; slight flatulence; no constipation. Much improved, nineteen months.

CASE V, B. C., F. Thirty-three years. Never robust. Weak lungs, chills and fever at fourteen years. For many years subject to cramps and diarrhoea, with increasing depreciation in general health. From twenty-five years of age has spent nearly half her time in bed at various sanatoria, with temporary improvement especially in weight. When twenty-seven years of age, appendix was sought but not found. A retroperitoneal gland was removed which was said to be tubercular. At thirty years of age began to have attacks of unconsciousness followed by severe pain, nausea, and great weakness, which have become gradually more frequent, with much abdominal pain and alternating constipation and diarrhoea between times. No stamina. One hundred per cent. disability. Sense of downward dragging in epigastrium constant; somewhat relieved by crouching forward.

P. Ex.: Just after three months at sanatorium. Small frame; fairly nourished; good color. Heart, lungs and urine: negative. Blood: Hæmoglobin 100 per cent.; R. C., 6,187,000. Pressure, 124/84. Stomach: 100 c.c. retention, three hours after 200 c.c. meal. Achlorhydria. Stool: negative. Abdomen: small appendix scar. Tenderness over cæcum which is distended and tympanic. Stomach: dilated; tympanic; tenderness to right of mid-epigastrium.

X-ray series: Stomach: fish-hook; much dilated; down to true pelvis; atonic peristalsis. Duodenum: apex fixed high; sharply angulated; cap distorted. Cæcum: dilated; prolapsed into pelvis. Ileac stasis. Hepatic flexure fixed high near angulated duodenum. Pre-operative diagnosis: Hepato-duodenal membrane. Pericolic membrane.

Operation: 10-20-1916. Incision: T. R. R. Four cm. above navel. Findings: Hepato-duodeno-colic membrane, short and rigid, holding duodenal apex fast, causing kinking and compression. Stomach: much dilated; thin walled; over in right side, bent back on itself to reach fixed duodenum. Liver: normal; gall-

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bladder: normal, except for membrane. Omentum: firmly adherent to scar of appendix operation. Peritoneal membrane: kinking and compressing cæcum and ascending colon, especially at hepatic flexure. Appendix: small; retrocæcal for 3 cm.; free for 1.5 cm. of tip. No signs of tubercular infection of peritoneum, of intrinsic disease of stomach or intestine, or of pelvic organs. Procedure: Division of hepato-duodenal membrane with mobilization of duodenum downward 6 cm. Appendectomy. Division of peritoneal membrane. Convalescence: Uneventful. The day after operation she stated the "sense of dragging" in the epigastrum was gone for the first time in years.

Result: No digestive disturbance, unless greatly fatigued; no restriction in diet. Gained fifteen pounds. Color good. Strength and endurance normal. Does all kinds of household and social duties continuously. Cured, five years, two months.

CASE VI, F. M., M. Fifty years. For over thirty years accustomed to sudden attacks of severe abdominal cramps with nausea and vomiting and temporary total disability, coming at irregular intervals, and having no apparent relation to meals.

There was no indigestion between attacks, the appetite was good and the bowels regular and he was well nourished. When forty-nine years old an attack took the form of typical biliary colic, but was not followed by jaundice or fever. A selected, restricted diet reduced his weight 40 pounds, and almost eliminated the attacks during the next eleven months. During the following month he had two severe attacks and felt weak and miserable all the time. During the last ten days pain and tenderness developed in the right hypochondrium and over the lower ribs, aggravated by deep breathing or using the right arm. Constipation has gradually developed, as has a sense of depression and lassitude. Ordinarily he is a most energetic, persistent worker. The heart shows considerable irregularity when tobacco is used. He has had a chronic cough for several years.

P. Ex.: A man of large size, well nourished, worried and pale. Lungs: chronic bronchitis; no pleuritic friction sounds. Heart: no enlargement; slight systolic murmur at apex. Pulse: regular, 72, and good quality. Urine: normal. Abdomen: prominent; wall fat; marked tenderness over right hypochondrium and lower ribs, also hyperesthesia. Deep breathing prevented. Tenderness about one-third from the xiphoid to navel. No tenderness over appendix or cæcum. Gall-bladder could not be felt.

X-ray series: Stomach of moderate size, cow-horn shape; marked peristalsis; no retention; no sign of ulcer. Duodenum: cap round with hazy outline; apex fixed high, well to the right and immobile. Gall-bladder: shadow seemed enlarged and contained two shadows suspicious of stones. Hepatic flexure: held high, fixed and angulated. Cæcum and first half of ascending colon greatly dilated. Ileac stasis. Pre-operative diagnosis: Hepato-duodenal membrane. Peritoneal membrane. Biliary calculi.

Operation: 11-9-1916. Incision: T. R. R. Three cm. above navel. Findings: Gall-bladder seemed normal in every way and contained no stones. No stones in common duct to be felt. Pancreas: normal to palpation. Liver: normal. Stomach: not large; wall thicker than normal, but otherwise negative. Hepato-duodenal membrane: from the cystic duct and neighboring liver ran to pylorus and duodenum, fixing them firmly against liver and duct, and then down and outward to hepatic flexure. It contained many vertical white threads, was inelastic, held the apex of duodenum high and well back, and caused kinking and compression. This membrane surrounded the cystic duct so that pulling downward on the duodenum caused torsion and angulation of the cystic duct, possibly accounting for the apparent attacks of biliary colic. Peritoneal membrane: covered cæcum and ascending colon with thickened bands crossing the middle of ascending

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colon and the hepatic flexure. Cæcum considerably dilated. Ileum: negative. Appendix: about 15 cm. long, 1 cm. in diameter; much congested; filled with soft faeces. Procedure: Mobilization of duodenum 10 cm. downward and forward, freeing cystic duct of the traction. Appendectomy. Division of pericolic membrane and bands, freeing colon. Pathological report: Catarrhal appendicitis. Convalescence: For five days persistent hiccup, nausea and regurgitation. Abdomen soft, not tender; bowel expelling flatus. Thereafter improved steadily. Ninth day inner end of wound discharged about 6 ounces of liquefied purulent fat. Infection cleared up in five days by irrigations with Dakin's solution, and healing complete about two weeks later. For three weeks following operation he had some of the old spasms of pain, but they were much less severe and often would be aborted, which had never previously occurred. They gradually faded away. Seven weeks after operation he had gained 12 pounds, looked and felt well, the wound was solid, and he had no pain for three weeks. Three months after operation, subsequent to aggravation of his chronic cough, he developed a hernia, the ends of the rectus being separated 5 cm. On May 30, 1917, under two per cent. novocaine, the hernia was repaired, and has remained solid.

Result: Five years, three months. Some pain; apt to follow high carbohydrate diet. Moderate flatulence and constipation. Appetite excellent; carbohydrate restriction necessary. Color much improved. Capacity for work greatly increased. Much improved, five years, three months.

CASE VII, M. W., F. Fifty-three years. When twenty-three years old had very severe attacks of sick headache, vomiting, photophobia, constipation, etc. Correction of refraction gave some relief. Since thirty-eight years old has had constant distress after eating, a sense of dragging and distention rather than actual pain, followed by sour eructations, headache, and lassitude, mental and physical. Tires very easily. Constipation very troublesome, stools scybalous. The troubles have gradually increased. Menopause at forty-eight; no special disturbance. Dyspnea on exertion.

P. Ex.: She is a short, over-fat, flabby woman of good color. Marked pyorrhœa with recession of gums. Finger joints enlarged. Heart, lungs, urine: negative. Pulse 72. Abdomen: prominent, fat, tympanitic, showing marked tenderness over the appendix, and slight tenderness in the mid-epigastrum and over the sigmoid.

X-ray series: Stomach: fish-hook type, enlarged; extending to right of median line; showing twelve-hour retention; no evidence of ulcer. Duodenum: apex fixed high and angulated; cap distorted and irregular. Colonic and iliac stasis after seventy-two hours with barium still in appendix. Gall-bladder shows small round shadow, suspicious of stone. Pre-operative diagnosis: Hepato-duodenal membrane. Pericolic membrane. Chronic appendicitis.

Operation: 11-21-16. Incision: T. R. R. Three cm. above navel. Findings: Hepato-duodenal membrane running from near the fundus of gall-bladder to lower border of duodenum near pylorus, which was held firmly against gall-bladder, thus suffering axial rotation as well as high fixation. Duodenum then ran along gall-bladder to cystic duct, being firmly held by membrane. Gall-bladder: normal in every way except for membrane. Liver: normal. Stomach: much dilated; well over into right flank; bent backward and inward to gall-bladder. No intrinsic disease. Pericolic membrane: a firm, broad band ran upward and inward across middle of ascending colon causing marked compression. Cæcum: dilated and somewhat thinned. Appendix: long, distended and much congested. Pelvic organs: infantile; ovaries, fibrotic. Procedure: Hepato-duodeno membrane divided and duodenum mobilized downward 10 cm. Pericolic membrane divided and colon freed. Appendix: removed; stump in-

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verted. Convalescence: Uneventful. One week after operation the bowels moved spontaneously for the first time in years.

Result: No pain; occasional constipation and flatulence. Appetite is good. Restrictions as to apples, cabbage-family, and cooked cheese. Very great improvement in general health and capacity to work. Much improved, two years, eight months.

CASE VIII, A. G., F. Twenty-four years. Always frail, and always suffered from indigestion. When nineteen years old the appendix was removed in the hope of relieving the indigestion. After temporary improvement she began to have attacks of cramping pains, nausea and diarrhoea. From twenty-three and one-half years on, the attacks became much more frequent and severe, and were associated with marked distention and tenderness of the caecal region. Free catharsis causes some relief for one or two days. She was totally incapacitated.

P. Ex.: She is of small size; brunette; well nourished, with marked overgrowth of hair generally; with enlarged thyroid but with no rapid pulse or exophthalmos. Extremely nervous; muscles all undergo tonic spasm on palpation. Heart: systolic murmur over left second space. Lungs: negative. Respiration: thoracic in type. Abdomen: Right, oblique, appendix scar. Cæcum: distended and very tender, dull to percussion. Remaining colon, tender, tympanitic. Gastric contents: negative.

X-ray series: Thought inadvisable, because of the nervous general condition and the marked abdominal disturbances. Pre-operative diagnosis: Pericolic membrane constricting colon.

Operation: 2-20-17. Incision: Vertical R. R., mostly above navel. Findings: Omental adhesions to appendix scar and to inner side of colon just above ileum, causing rotation of colon forward and outward. Pericolic membrane covered entire ascending colon, its upper edge was much thickened and caused compression, kinking and marked obstruction near hepatic flexure. Hepato-duodenal membrane of moderate size from proximal gall-bladder to first part of duodenum. Gall-bladder normal except for membrane. Liver: small and thin (patient also quite small). Stomach: normal. Ilium: normal. Cæcum: not flabby or dilated. Pelvic organs: normal. Procedure: Omental adhesions separated from appendix scar and colon. Damaged omentum resected and raw stump inverted. Pericolic membrane divided and colon mobilized. Hepato-duodenal membrane: divided and duodenum mobilized downward 2 to 3 cm. (This membrane was not causing very obvious disturbance but was divided on general principles.) Convalescence: Uneventful. The old attacks disappeared.

Result: Two years, five months, no pain; no flatulence; good appetite; no dietary restrictions; has gained weight; improved in complexion. Completely recovered health and endurance. Cured, two years, five months.

CASE IX, W. F. R., M. Fifty-five years. Always perfectly well until forty-nine years old, when accident caused loss of left upper extremity and persistent pain in left brachial plexus; this pain has persisted in spite of root section. When fifty-three years old began to have severe pain and great bloating after eating. This trouble increased so much that he ate only tea and toast from fear of the pain. Constipation became very aggravated. During the two months preceding operation he lost fifteen pounds, although he had been very thin for years.

P. Ex.: He is emaciated, pale and haggard. Heart and lungs: negative. Gastric contents: negative as to chemistry and blood. Stools: negative to blood. Abdomen: distended, tympanitic, especially over the cæcum, no tender areas anywhere.

X-ray series: Stomach: dilated, fish-hook type, atonic, six-hour retention, no ulcer. Duodenum: high fixation; angulation at apex; cap not deformed; no ulcer. Cæcum and first half of ascending colon dilated but above that to

well beyond hepatic flexure colon appeared constricted and twisted. Appendix: not visualized. Pre-operative diagnosis: Hepato-duodenal membrane. Pericolic membrane.

Operation: 3-19-17. Incision: T. R. R. just above navel. Findings: Stomach: greatly dilated, distended, reaching over to right flank and bending backward, inward and upward to duodenum. No evidence of ulcer. Duodenum: apex adherent to under surface of liver to left of cystic duct. Hepato-duodenal membrane: from cystic duct and proximal gall-bladder to apex of duodenum, down duodenum to pylorus, greater curvature and so on, to transverse colon, which was firmly bound to stomach for 3 cm. Liver and gall-bladder: normal except for membrane. Pericolic membrane: Broad, firm band (4 cm. wide) ran downward and inward across middle of ascending colon, kinking and compressing and twisting it. Appendix: shrivelled and adherent throughout. Procedure: Duodenum mobilized downward 6 cm. Pericolic membrane divided and colon mobilized. Appendix: removed, stump inverted. Pathological report: Chronic catarrhal appendicitis. Convalescence: Uncomfortable. Wound broke down on fifth day and healing was not complete until thirty-fourth day. For first few days there was much flatulence and pain, but these yielded and soon his digestion was comfortable and his constipation almost disappeared.

Result: Two years, ten months. No pain; some gas; slight constipation; appetite good; no restrictions. General health and strength much better. Much improved, two years, ten months.

CASE XIII, A. V. P., F. Twenty-five years. For many years she has been subject to attacks of headache, nausea, vomiting and abdominal pain. Between attacks there is always discomfort, flatulence and constipation. The discomfort is chiefly in the right side. The attacks increase in frequency and severity, and are likely to be precipitated by indiscretions in diet. They cause a certain amount of apprehension and disability. In other respects she is very well.

P. Ex.: She is of small frame, quite fat, and of good color. Heart and lungs: negative. Blood: Hæmoglobin, 100 per cent.; red blood-cells, 5,280,000. Abdomen: distended and tympanitic, especially on the right side. Tenderness along the entire colon, but especially along the ascending colon. Localized tenderness over the appendix area and just to the right of mid-epigastrium.

X-ray series: Taken three years before above examination. Showed "disturbances about the cæcum, but nothing wrong with stomach or pylorus." Pre-operative diagnosis: Hepato-duodenal membrane. Pericolic membrane. Chronic appendicitis.

Operation: 8-4-17. Incision: Vertical R. R. Findings: Stomach: somewhat dilated; fish-hook; no ulcer. Duodenum: apex fixed high; kinked, compressed by. Hepato-duodenal membrane: extending half way to fundus of gall-bladder, running to first portion of duodenum. Liver and gall-bladder: normal. Pericolic membrane: about 7 cm. broad, running downward and inward across middle of ascending colon and clamping it back against body wall, causing much obstruction. Cæcum: somewhat dilated; rolled forward and upward over the lower edge of pericolic membrane. Appendix: 5 cm. long and about 2 mm. thick, bound to cæcum. Hepatic flexure: fell forward and downward over the upper edge of pericolic membrane, causing a double twist-kink of the gut. Pelvic organs: quite small, but otherwise normal. Procedure: Mobilization of duodenum downward 7 cm. Mobilization of ascending colon. Appendectomy. Pathological report: Chronic oblit. appendicitis.

Result: Complete cure. Cured, four years, four months.

CASE XV, E. H. W., F. Forty-two years. All her life she had been subject to epigastric pain and digestive discomfort. Chorea and endocarditis as child.

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When twenty years old had an attack of severe pain in right lower quadrant, lasting nearly a week. These have recurred about twice a year since. When thirty-three, heart lesion became serious and has given much trouble since. When forty the digestive attacks became much more frequent and severe and the caecal region would balloon up. She developed definite colitis with alternating constipation and diarrhoea. Her diet became very restricted, she lost weight and became totally incapacitated. She has always felt a dragging sensation in upper abdomen.

P. Ex.: She is of small frame, fairly nourished, pale and haggard. Very neurotic but optimistic. Lungs: negative. Heart: mitral, systolic, lesion; poorly compensated. Urine: gastric contents; stools: negative, except for mucus in stools. Abdomen: somewhat distended and tympanitic. Tenderness along entire colon, but marked and localized over appendix and to the right of mid-epigastrium. Stomach: seems enlarged downward and to right.

X-ray series: Stomach: fish-hook; no retention. Duodenum: apex high, angulated; deformity of cap but not indicative of ulcer. Cæcum: dilated. Hepatic flexure: fixed high and sharply angulated. Pre-operative diagnosis: Hepato-duodenal membrane. Pericolic membrane. Chronic appendicitis. Colitis.

Operation: 10-10-17. Incision: T. R. R. just above navel. Findings: Stomach: negative. Hepato-duodenal membrane: out to middle of gall-bladder and down to pylorus and duodenum which were held within 5 cm. of gall-bladder. Gall-bladder and liver: normal. Cæcum: dilated. Appendix: long, large, angulated, retrocaecal. Pericolic membrane: one band fixing hepatic flexure high and angulating it; one band across middle of ascending colon, constricting it. Procedure: Mobilization duodenum downward 7 cm. Mobilization colon and hepatic flexure. Appendectomy. Convalescence: Uneventful. On the first day she states the old dragging sensation was gone from the epigastric region.

Result: Because of the serious heart lesion her general health has been very variable. Four years and two months after operation she had none of her old pains; no flatulence; no constipation or diarrhoea; good appetite and a few restrictions of diet. Color is better, and general health improved. Improved, four years, two months.

CASE XVI, H. J., F. Twenty-four years. She has always had frequent digestive disturbance accompanied by marked constipation since childhood. She was otherwise well. When nineteen she had an attack of severe pain, distention and constipation. There was some tenderness in the right lower quadrant. Appendix was removed. Since operation pains have been much more frequent, much more severe. The stubborn constipation has developed, sometimes alternating with mucus diarrhoea. Her general condition has depreciated more and more until she has become a chronic invalid, almost completely disabled. During the later attacks food has caused pain and nausea so the diet has become extremely limited. When lying down she is comparatively comfortable, but the erect posture always induces pain. During the last year she has lost 25 pounds in weight and has marked loss of stamina. She has frequent headaches.

P. Ex.: She is tall, rather slender, of fair color. Skin is flabby, dry and somewhat parchment-like. Heart and lungs, urine, gastric contents and stool: negative. Abdomen: distended, especially on the right side. Cæcum: distended; quite tender to pressure and can be made to roll and gurgle under the fingers. Tenderness: extends upward to about level of navel. There is also tenderness in the mid-epigastrium and over the sigmoid which is also distended. On percussion the right iliac fossa and up to the edge of the tender area there is flatness. Elsewhere the abdomen is tympanitic. Stomach: seems enlarged.

X-ray series: Reported to have shown high fixation of apex of duodenum. Stomach: somewhat enlarged; fish-hook type. Transverse colon: marked ptosis, and apparently much longer, as a whole, than the average. Hepatic flexure:

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fixed and angulated. Pre-operative diagnosis: Hepato-duodenal membrane. Pericolic membrane. Adhesions.

Operation: 11-22-17. Incision: T. R. R. Just above navel. Findings: Stomach: was much enlarged, projected way over to right flank; turned backward, inward and upward to apex of duodenum. Pylorus and first part of duodenum lay in contact with gall-bladder from fundus to cystic duct and was held in close contact by typical, hepato-duodenal membrane: running from middle of gall-bladder to cystic duct. Except for the membrane the stomach, pylorus, duodenum, gall-bladder and liver were normal. Cæcum: was much dilated, rather thin and pale. It was not adherent to the old appendix scar. There was one adhesion between the omentum and the old scar. Pericolic membrane: involved the ascending colon from the hepatic flexure, which was kinked and compressed, down to the lower part of the ascending colon somewhat above the cæcum. A thick transverse band crossed the middle of the ascending colon, compressed it tightly and kinked it strongly. Pelvic organs: normal in every respect. Descending colon and sigmoid: normal. Procedure: Mobilization of duodenum and pylorus downward about 5 cm. Omental adhesion separated. Pericolic membrane divided and colon mobilized. Convalescence: For the first thirty-six hours there was considerable nausea and vomiting. Headache followed for two days afterward. Considerable abdominal pain for first five days. After the five days she was comfortable except for occasional attacks of gripping pain, which were relieved by belladonna. There was stubborn constipation in spite of irrigations or cathartics. Temperature for first few days became subnormal; remained almost constantly at 96.2, with pulse varying between 56 and 60. She feels tired out constantly. Has no real appetite. Wound healed by primary union.

Result: Four years, one month. Much improved. Has occasional abdominal pain but never severe. Occasional flatulence. Constipation is still present. Appetite variable but can eat a greater variety than before. Has gained a few pounds in weight. Much improved in color. General health is much improved. Rarely has headache. Since operation she had had influenza and two children and in spite of that has shown marked improvement. Much improved, four years, one month.

CASE XVII, W. T. J., M. Twenty-seven years. He was perfectly well in every way until twenty-six years old when he developed a nervous breakdown. He was beginning to get in shape when he had two successive attacks of influenza in January, 1917. His neurasthenia recurred. In the fall when much improved he had entered a training camp, but the strenuous life soon caused another breakdown and he was discharged from the service. He has had no pain in the abdomen, but for over a year has had much flatulence and a sense of heaviness and dragging after eating. The bowels have been regular without drugs.

P. Ex.: He is tall, slender, dark complexion, looks slightly pale and depressed. He is very nervous and hysterical. Heart, lungs, gastric contents and stool: negative. Urine: negative, except for a faint trace of albumin. Blood-pressure: 144 mm. Abdomen: Normal in contour and not much distended. There is normal tympany. There is very definite localized tenderness in the appendix region. Moderate tenderness in the mid-epigastrium.

X-ray series: Stomach: slightly enlarged; fish-hook type; projects well to the right of median line and seems fixed. Peristalsis is vigorous, and stomach was empty in three hours. Apex of duodenum is fixed high and is angulated. Cæcum: conical in shape and is in the true pelvis. Hepatic flexure: somewhat high and angulated. No sign of ulcer of stomach or duodenum, or of gall-stones. Appendix: not visualized. Pre-operative diagnosis: Hepato-duodenal membrane. Pericolic membrane. Chronic appendicitis.

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Operation: 11-27-17. Incision: T. R. R. Two cm. above navel. Findings: Stomach: enlarged; well over to the right, backward, upward and inward to duodenum. Apex and first part of duodenum: fixed high, kinked and compressed. Otherwise, stomach, pylorus and duodenum were negative. Hepato-duodenal membrane: about 4 cm. wide, from gall-bladder and cystic duct to first portion and apex of duodenum, allowing only 1 cm. mobility. Pericolic membrane: along most of the ascending colon with thickened mid-portion running across middle of ascending colon. It constricted the gut and kinked it definitely. Cæcum: moderately dilated. Appendix: quite irregular in calibre, about 8 cm. long. It was not adherent. Procedure: Mobilization of duodenum downward 5 cm. Mobilization of ascending colon by division of pericolic membrane. Appendectomy. Convalescence: Uneventful. Free from pain, nausea or any disturbance. Recovery of strength, weight, color and nervous energy. Mental balance very rapidly recovered.

Result: Four years. Absolutely well in every way. Has no digestive disturbance of any kind. Gained thirty pounds in weight with much improvement in color. He states that his general health and capacity for work have increased "1000 per cent." He also states that his whole mental attitude is now normal and steady. Cured, four years.

CASE XVIII, M. N., F. Thirty-nine years. As a child she was subject to attacks of pain in the right lower quadrant. She had occasional constipation and a fickle appetite. She has had two children and perineorrhaphy following the second one. Since a definite attack when she was thirty-four years old there have been frequent repetitions. Often the pain lasts for only ten or fifteen minutes, but the side would be sensitive to pressure and the pain would recur during a week or so whenever she walked or exercised. She has had frequent headaches and there has been marked loss of general health and strength as well as in weight. Her physician reported that she had developed definite phychosis during her thirty-ninth year. She is likely to do things very vigorously and persistently for a few days and then go to pieces for one or two weeks.

P. Ex.: She is tall, sallow, weighs only 110 pounds. She is nervous, irritable, liable to obsessions; very energetic up to a point of exhaustion. Heart, lungs, urine: negative. Abdomen: flat; scaphoid and wall seems devoid of fat but muscles are well developed. Stomach: somewhat enlarged and tympanitic. Distinct tenderness localized in appendix area. Cæcum: dilated and gurgles with gas whenever compressed. Tenderness: just below the ninth costal cartilage, right side. Bimanual examination of the pelvis showed nothing.

X-ray series: Omitted for various reasons. Pre-operative diagnosis: Chronic appendicitis. Jackson's membrane.

Operation: 12-4-17. Incision: T. R. R. Two cm. above navel. Findings: Stomach: Freely movable; greatly distended with gas, well over into the right side. Duodenum: apex adherent to cystic duct and proximal gall-bladder (hepatoduodenal membrane), and in addition by some very firm, thick adhesions to the under surface of liver 2 cm. to the right of gall-bladder. No ulcer could be made out in either the duodenum or stomach. Gall-bladder and liver: normal otherwise. Right kidney: normal, but more freely movable than usual. Cæcum: free, somewhat dilated. Appendix: thickened, retrocæcal. Pericolic membrane: involved ascending colon from just above the cæcum to the hepatic flexure which was kinked and compressed by a strong, short band. Pelvic organs: uterus anteverted, freely movable. Right ovary: very fibrous and showed a hard, nodular growth at the hilus. Left ovary was a single cyst. Procedure: Mobilization of duodenum downward 4 cm. Mobilization of ascending colon and hepatic flexure. Appendectomy. Oophorectomy through Pfannenstiel incision. Convalescence; Perfectly uneventful.

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Result: Four years. Occasional abdominal pain, never severe. Some flatulence; no constipation. Appetite, variable. No restriction of diet. Has gained sixteen pounds in weight. Color much improved. Capacity for work has "enormously" improved. In addition, psychosis and nervous instability have disappeared. She is now a perfectly normal woman. Much improved, four years.

CASE XX, D. C., F. Twenty-three years. She had had so-called nervous indigestion at various periods in her life. Tonsils were removed at seventeen years because of repeated attacks of rheumatic pain. These rheumatic pains were attributed to some focus of infection, but examinations of the various nasal sinuses, teeth and throat show no focus. Appendix had been removed several years ago. The only thing left to lodge infection was, therefore, the gastrointestinal tract and her history was not very conclusive. There had been various disturbances of digestion associated with flatulence, constipation and a variable appetite.

P. Ex.: She is a young woman of medium height, very well nourished, good color. Heart, lungs, mouth, throat, teeth, urine, gastric contents, stool: negative. Abdomen: appears normal. There is moderate distention with gas. Marked tenderness on the inner side of her short, oblique appendix scar. Marked tenderness in about the middle of ascending colon. Also localized tenderness in the mid-epigastrium. Otherwise abdominal examination is negative.

X-ray series: Stomach: considerably enlarged, much ptosed, fish-hook type. Peristaltic waves were atonic. Marked retention after eight and one-half hours, and for the first three hours almost none of the barium was discharged. Duodenum: first portion much enlarged but without other deformity. It is fixed in a high position. Cæcum: dilated. Some stasis in ileum and cæcum. Appendix: not visualized. Transverse colon: elongated and ptosed. There is evidence of constriction in the hepatic flexure, which is, however, only slightly above the iliac crest. Pre-operative diagnosis: Hepato-duodenal membrane. Peritoneal membrane.

Operation: 1-30-18. Incision: T. R. R. Findings: Stomach: greatly enlarged; pushed over to right and then bent backward, inward and upward. Walls were somewhat thinner than normal. Duodenum: apex was fixed high by short and very thick free edge of lesser omentum which extended slightly onto proximal end of gall-bladder. This membrane was very vascular. Also there was an extension which passed across the front of first portion of duodenum to hepatic flexure which it helped to suspend and kink. Liver and gall-bladder: normal. Cæcum: much dilated. It was somewhat adherent posteriorly to iliac fossa. Peritoneal membrane: covered cæcum and ascending colon. One thickened band passed across the colon just above cæcum and the second one passed transversely across the ascending colon just below the hepatic flexure and ran to beginning transverse colon so as to sharply angulate the hepatic flexure, also both limbs of gut just below the hepatic flexure. Kidneys and pelvic organs: normal. Procedure: Mobilization duodenum downward 4 cm. Mobilization cæcum, ascending colon and hepatic flexure. Convalescence: Uneventful.

Result: Occasional abdominal pain but of a different kind, troubled with flatulence; some constipation; appetite very good. No restriction of diet. Gained ten pounds in weight. Improved in color. Her general strength is much better. Some little time after operation she had much pain in the back and it was found that there was some disturbance of dorsal xi and xii of probably tubercular type. For this she has been wearing a brace, and it is still causing some disturbance. Much improved, eighteen months.

CASE XXII, E. S. W., M. Fifty-five years. Always perfectly well until fifty-three and one-half years old. At that time he had an attack of vertigo with nausea, vomiting, violent diarrhoea and some temperature. Absolutely no

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further trouble until fifty-five years old. On February 8, 1918, he awoke in the morning with a dull, aching pain in the epigastrium. No nausea or diarrhoea; after two hours the pain ceased, but he was exhausted for three days. Nine days later he walked three miles in the cold and ate a hearty dinner. Awoke at one o'clock in the morning with pain, which grew steadily worse until he was given a hypodermic. The next morning temperature was 104. Thirty-six hours after the onset there was distinct jaundice both of the skin and conjunctiva. There was very marked prostration. He has never had any constipation and says he has never had indigestion. His family doctor states that he is always troubled with some flatulence and discomfort because he leads a very sedentary life and is inclined to over-eat.

P. Ex.: Large man, well nourished, fair color, but slightly icteric. Teeth: good condition, but there is some recession of the gums. Heart, lungs: normal. There is marked accentuation of the aortic second sound. Blood-pressure, 188/114. Urine: shows faint trace of albumin, considerable bile coloring and hyaline casts. Abdomen: prominent; quite fat; no tenderness can be made out anywhere. Just below the ninth and tenth costal cartilage it seems distended. Gall-bladder can be felt; also percussion shows dullness and flatness in the same area. Edge of the liver could not be made out. Appendix: no tenderness. Blood examination: negative.

X-ray series: In gall-bladder region shows shadow the size of a large egg. Shows no shadow of stone or stones. Pre-operative diagnosis: Cholecystitis with biliary calculi.

Operation: 3-16-18. Incision: T. R. R. Three cm. above navel. Findings: Stomach: enlarged, crowded well over to right of median line, passed upward, backward and inward to duodenum. Duodenum: apex held high and kinked by membrane. Gall-bladder: somewhat distended, tense and rather larger than normal. No stones were in it. Toward the cystic duct there was a projection of liver 8 cm. long, 4 cm. wide and not quite 1 cm. thick folding down around the left side of the gall-bladder nearly to its lower median line. From this projection of liver a firm peritoneal membrane passed to the duodenum which it held very firmly, close up under the liver. This membrane also passed to the cystic duct and caused a sharp kink in it. Pylorus and stomach: normal except for the dilation. Gall-bladder: opened and exposed, dark bile was obtained but there were no stones. Mucous membrane looked perfectly normal. Wound in gall-bladder closed. Common duct and pancreas: showed no evidence of stone or other disturbance. Liver: seemed normal in every way. Cæcum: somewhat dilated. Appendix: free. Right edge of omentum ran downward and outward, its base passing around the hepatic flexure and down the ascending colon. It covered practically the whole ascending colon and was adherent to parietal peritoneum along outer side of colon. Procedure: Mobilization duodenum downward about 5 cm. Omentum was separated from ascending colon and cæcum and from adhesions to external parietal peritoneum with resulting release of ascending colon. Appendectomy. Because of opening and suturing of gall-bladder a small cigarette drain was passed through the outer angle of the wound. This was removed on the second day. Convalescence: Uneventful, but somewhat slow because of the physical prostration preceding operation.

Result: Three years. After the first few weeks he has been perfectly well in every way. Has recovered his old-time vigor and has absolutely no digestive disturbance. Cured, three years.

CASE XXIII, E. S., F. Twenty-two years. Typhoid when ten years old. Headaches frequent ever since. Periods began at fourteen; regular, scanty, pain at start. When seventeen years of age she became fatigued very easily, and lost weight and color. When nineteen years old she had to give up college because of

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fatigue, constipation, pain and flatulence. Chronic appendicitis was diagnosed and the appendix removed. Recovery was slow and there was no relief whatever but the symptoms were aggravated, and for about a year the attacks of pain, nausea, flatulence and constipation varying in severity and frequency almost completely disabled her. The attacks of pain have lately been associated with diarrhea. She has become very nervous and "jumpy" and often has vertigo. The pain has gradually become most definite in the right lower quadrant.

P. Ex.: She is a good sized, somewhat fat, pale young woman. Heart, lungs, urine and blood: normal. Abdomen: somewhat prominent, and tympanitic; tender over the cæcum, gall-bladder and just to the right of the mid-epigastrium.

X-ray series: Stomach: fish-hook, dilated markedly; not emptied until four and one-half hours. Peristalsis active; no evidence of ulcer. Duodenum: apex fixed high, cap small and somewhat irregular but not suggestive of ulcer. Stasis: in ileum marked at 8.5 hours; in cæcum and ascending colon at 36 hours and 48 hours, respectively. Cæcum: dilated; often in true pelvis. Transverse colon: ptosed, dips into true pelvis. Hepatic flexure: sinks often to level of iliac crest. Gall-bladder and urinary system: negative. Pre-operative diagnosis: Hepato-duodenal membrane. Pericolic membrane. Post-operative adhesions.

Operation: 3-26-18. Incision: T. R. R. Two and five-tenths cm. above navel. Findings: Hepato-duodeno-colic membrane from gall-bladder and cystic duct to pylorus and beginning duodenum, holding them fast beneath liver and to transverse colon. Stomach: deflated; of moderate size; no ulcer. Adhesion: inflammatory; from the under surface of quadrate lobe to peritoneum overlying vena cava. No origin discernible. Omentum: adherent to appendix scar. Pericolic membrane: covered entire ascending colon, the upper end of which made one complete loop behind the membrane at the hepatic flexure. Pelvic organs: infantile. Lymphadenitis: retroperitoneal in ileo-caecal angle. Procedure: Mobilization duodenum downward 6 cm. Mobilization ascending colon and freeing of loop. Separation of omental adhesions. Removal of some lymph-glands. Pathological report: Tubercular lymphadenitis with calcified areas. (Healed?) Convalescence: Uneventful.

Result: At nine months tremendously improved; had gained much in weight, color and energy and was back at her studies. At three years, nine months: occasional pain, flatulence and constipation. Appetite very good; no restrictions as to food. As a rule is much better than before operation. Much improved, three years, nine months.

CASE XXIV, G. S., F. Forty-four years. Has always had digestive disturbance but paid little attention to it. Periods began at twelve, always irregular, scanty, but without pain. When forty-two had several attacks of persistent metrorrhagia spread over the following year. When these finally stopped she had a marked increase in her digestive disturbances with pain, slight nausea and a sense of dragging down the stomach after eating. When forty-four years old she had a severe attack of pain, nausea, vomiting, diarrhoea, with pain and tenderness in the right lower quadrant which lasted a week. Four days later a more severe attack was associated with great abdominal distention, with chilly sensations. For six weeks had noticed a small tumor in right breast. For nineteen years varicose veins in right leg.

P. Ex.: She is of medium-sized frame, emaciated and pale. Artificial teeth. Throat, heart, lungs, urine and stool: negative. Blood: Hæmoglobin, 80 per cent.; red blood-cells, 4,000,000. Small benign tumor in right breast. Thrombosed varicose veins about inner side right knee. Abdomen: distended with gas, especially on the right side; the walls flabby and thin. Cæcum: is dilated and gurgles on pressure; is tender to its inner side; marked localized tenderness over

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the appendix. Tenderness in mid-epigastrium. Stomach: much dilated; tympanic and prolapsed.

X-ray series: Stomach: marked fish-hook type; lower border in true pelvis; atonic peristalsis; no evidence of ulcer; pyloric end well over in right side. Duodenum: apex fixed high at lumbar ii, and in same position both in erect and prone plates; cap not filled out and irregular, especially in erect posture, but not suggestive of ulcer. Cæcum and ascending colon: dilated. Hepatic flexure: fixed at same level as duodenum apex and obviously constricted, barium not passing it in the first twenty-four hours. Transverse colon: hangs into true pelvis in the forty-eight-hour plate. Appendix: visualized in twenty-four-hour plate. Pre-operative diagnosis: Hepato-duodenal-colic membrane. Pericolic membrane. Chronic appendicitis. Benign breast tumor. Thrombosed varicose veins.

Operation: 4-8-18. Incision: T. R. R. Just above navel. Findings: Stomach: much dilated; well over in right side; bent sharply back, up and inward to pylorus and duodenum. No ulcer. Liver and gall-bladder: normal, except for membrane. Hepato-duodenal-colic membrane: from middle of gall-bladder backward to cystic duct where the apex of duodenum was held up tight and sharply kinked. The membrane extended down first part of duodenum to lower border of pylorus and then over to beginning transverse colon, where it was continuous with: Pericolic membrane: extensive; covered whole ascending colon and cæcum; it crossed upper colon and hepatic flexure to transverse colon and joined hepato-duodenal-colic membrane causing a U-shaped bend of the transverse colon behind the veil with triple angulation and marked obstruction. Cæcum: dilated; adherent to iliac fossa; covered by pericolic membrane. Appendix: moderate size; adherent. Pelvic organs: negative. Right kidney: rather large. Left kidney: rather small. Procedure: Mobilization of duodenum downward. Mobilization of cæcum and colon. Appendectomy. Removal of breast tumor. Removal of varicose veins. Convalescence: Uneventful.

Result: No pain; no flatulence; no constipation; good appetite; no restrictions in diet. Has gained weight, color and strength. Cured, fifteen months.

CASE XXV, C. W., M. Sixty-five years. For many years indigestion with colicky pains and flatulence, but no constipation. At sixty years strained his back, and always weakened since. At sixty-two years digestive trouble became progressively worse, with increased pain, flatulence and constipation which became obstinate, anorexia, and loss of twenty pounds in two months. There was increasing weakness. Never vomited, never passed blood and has never had any urinary disturbance.

P. Ex.: He is of good-sized frame, muscular, well nourished and of good color. Heart, lungs, urine and blood were negative. Abdomen: distended; tympanic; muscles strong and firm, tender over the cæcum (which is not distended), over the gall-bladder region, in the mid-epigastrium and in the right costo-vertebral angle. No growth can be made out anywhere.

X-ray series: Stomach: not enlarged; peristalsis vigorous; has passed seventy-five per cent. of meal in two hours, no sign of ulcer or malignancy. Duodenum: apex fixed at upper edge lumbar ii and varies scarcely one cm. between erect and prone position. Cap somewhat distorted as though by periduodenal adhesions. (Series could not be completed because of patient's condition at the time.) White blood-cells, 12,000; S. L., 23 per cent.; polymorphonuclears, 75 per cent. Rectum: negative. Prostate: moderately enlarged, firm, but not tender. Pre-operative diagnosis: Hepato-duodenal membrane. Possible malignant growth.

Operation: 5-4-18. Incision: T. R. R. Just above the navel. Findings: Stomach: not enlarged; walls somewhat thickened. Duodenum: apex was held close up under cystic duct by hepato-duodenal membrane running from proximal

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gall-bladder, and causing high fixation and marked angulation. This membrane did not fuse into the gastro-hepatic omentum as usual but was clearly separated. Pancreas: normal. Cæcum: bound by postero-external adhesions. Appendix: 7 cm. long, bulbous; intensely congested. Pericolic membrane: covered ascending colon; with one thickened band compressing the middle of the gut and another fixing the hepatic flexure high and kinking it. Liver, gall-bladder, transverse colon, splenic flexure, descending colon and rectum showed nothing abnormal. Prostate: somewhat enlarged; firm; not nodular. Kidneys and bladder: negative. Lymphatic glands about the internal iliac vessels on both sides were greatly enlarged and somewhat matted together. No cause could be identified. Procedure: Mobilization of duodenum downward 5 cm. Mobilization of colon and hepatic flexure and cæcum. Appendectomy. Convalescence: Uneventful, except for phlebitis in left calf. Returned home in good condition on twenty-fourth day, with very little digestive disturbance.

Result: After a few weeks pain recurred, especially in lower abdomen; eight months later urinary symptoms appeared; the prostate became nodular and he eventually died of carcinoma of the prostate. Failure.

CASE XXVII, R. T., F. Eleven years. Always athletic; appetite always large. Always subject to car-sickness. Always marked constipation, coated tongue and bad breath. Not much flatulence; occasional nausea but no vomiting. During her eleventh year she had irregular attacks of pain in right side of abdomen.

P. Ex.: She is large and muscular but pale and pasty. Mouth-breather as result of broken nose. Heart, lungs and urine: normal. Abdomen: normal to inspection; tender over cæcum, and especially under right rectus near navel. Sigmoid: spastic but not tender; no tender areas in upper abdomen. Cæcum: dilated and apparently thickened and tender. Liver: edge 3.5 cm. below free border but not tender.

X-ray series: Omitted because of time and expense. Pre-operative diagnosis: Pericolic membrane. Chronic appendicitis.

Operation: 5-11-18. Incision: Intramuscular at level of navel with Weir's modification. Findings: Cæcum: dilated; walls not thickened; filled with putty-like faeces. Appendix: small; adherent; containing several concretions. Pericolic membrane: with one band constricting colon just above cæcum and another angulating and constricting hepatic flexure. Hepato-duodenal membrane: fixing high and kinking duodenal apex. Liver and gall-bladder: normal, except for membrane. Pelvic organs: normal. Procedure: Mobilization of colon. Mobilization of duodenum. Fortunately the membrane was thin and avascular. It was divided but no suturing could be done. Appendectomy. Convalescence: Uneventful.

Result: Complete relief of symptoms; gain in weight and color; no constipation. Cured, three years, seven months.

CASE XXXII, A. L., F. Thirty-four years. Always suffered from great digestive disturbance. No pain but anorexia, nausea, flatulence and obstinate constipation. No headaches. These troubles have increased, especially since the thirty-second year, with frequent attacks of extreme fatigue, and with distinct loss of color and some loss of weight. Since thirty-one had several attacks of influenza. Periods: regular, scanty.

P. Ex.: She is tall, emaciated and pale. Eighty-six pounds weight. Heart, lungs and urine: negative. Blood-pressure, 100/80. Extremely nervous, restless and with muscles twitching. Abdomen: somewhat scaphoid; muscles irritable; tender; over spastic sigmoid; over middle of right rectus three cm. below navel, marked and localized. No tenderness in upper abdomen. No marked flatulence.

X-ray series: Stomach: fish-hook type; down to sacral promontory; 29 cm.

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long, 7 cm. wide; shows fair peristalsis. Empty at six hours. Duodenum: apex; erect, lower border lumbar iii; prone, upper border lumbar ii. Cap deformed, small, and apex sharply angulated. Cæcum and ascending colon: dilated. Hepatic flexure: mobile but always angulated. Transverse colon: prolapsed; in true pelvis; and showing stasis. Appendix: visualized throughout and segmented. Gall-bladder: negative. Pre-operative diagnosis: Hepato-duodenal membrane. Pericolic membrane. Chronic appendicitis.

Operation: 6-6-18. Incision: T. R. R. Two and five-tenths cm. above navel. Findings: Stomach: enlarged, pylorus dilated; otherwise negative. Duodenum: apex fixed high and kinked beneath cystic duct by membrane (hepato-duodenal membrane) running out nearly half way to fundus of gall-bladder. Liver: perihepatitis; upper surface and edge of right lobe. Gall-bladder: normal, except for membrane. Duodeno-jejunal angle: negative. Pericolic membrane: covering cæcum and whole ascending colon; quite thick; and with thick bands running across cæcum, the middle of ascending colon, and especially across hepatic flexure, causing obstruction and kinking. Transverse colon: long and prolapsed; free from adhesions. Appendix: atrophic; subperitoneal against cæcum. Pelvic organs and kidneys: normal. Procedure: Mobilization duodenum downward 6 cm. Mobilization cæcum and colon. Appendectomy. Convalescence: Uneventful but slow.

Result: No pain; occasional flatulence. Moderate constipation. Appetite much better; more general diet. Gained ten pounds. Color improved; general strength improved. Much improved, three years, six months.

CASE XXX, B. M., F. Twenty-nine years. Perfectly well until eleven years old when periods began; irregular, profuse, five to seven days, with much pain. At fourteen years developed rapid pulse and enlarged thyroid; disappearing under treatment. Tonsils removed at this time. At sixteen years had an attack of "appendicitis" but no operation was done. Ever since that time there have been intermittent disturbances of digestion, gradually becoming more frequent and persistent and severe. From twenty-six to twenty-nine years, in addition to the pains, flatulence, and tenderness over the whole right side, there developed headache, occasional nausea, marked pallor and profound fatigability. She became almost totally disabled. Appetite is fairly good; bowels move without medicine, but the stools are small, occasionally lumpy and with mucus. There is some urinary frequency with discomfort.

P. Ex.: She is of medium size, fairly nourished, pale and pasty with marked acne. Very nervous. Thyroid appears somewhat large. Pulse 80, good quality. Heart, lungs and urine: negative. Abdomen: normal appearance; tympanitic; not tender anywhere on *left* side; moderately tender in mid-epigastrium and over gall-bladder; marked tenderness over cæcum and ascending colon, which are distended, and marked localized tenderness over the appendix.

X-ray series: Stomach: marked fish-hook type; dilated; atonic; with lower edge below sacral promontory. Retention after 4.5 hours; no evidence of ulcer. Duodenum: apex at lower edge of lumbar ii in both erect and prone pictures; cap small in erect, and filled in prone pictures. No evidence of ulcer. Apex angulated. Second portion narrow. Cæcum and ascending colon: dilated below, constricted above, showing 48-hour stasis. Hepatic flexure: fixed high, level of upper border of lumbar ii, near duodenal apex; sharply angulated and constricted. Transverse colon: markedly prolapsed. Appendix: retains barium throughout the series; segmented. Enema shows incompetent ileocæcal valve. Gall-bladder and urinary apparatus: negative. Pre-operative diagnosis: Hepato-duodenal membrane. Pericolic membrane. Chronic appendicitis.

Operation: 6-11-18. Incision: T. R. R. Two cm. above navel. Findings: Stomach: much enlarged; well over in right flank; bent back, up and in to

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duodenum. Negative otherwise. Hepato-duodenal membrane: pylorus and duodenum fixed almost in contact with gall-bladder by short membrane from fundus to cystic duct. Duodenum: apex angulated and compressed. Liver and gall-bladder: normal except for membrane. Pericolic membrane: covered cæcum and colon up to hepatic flexure; two thickened bands, one just above cæcum and one at flexure causing elevation, angulation and compression. Appendix: very long, tortuous, with very short mesentery. Pelvic organs and kidneys: normal. Procedure: Mobilization duodenum, downward 6 cm. Mobilization, cæcum and ascending colon. Appendectomy. Convalescence: Uneventful.

Result: No pain; occasional flatulence; and mild constipation; appetite good; eats everything; gained some weight; much improved in color, and especially in endurance. She says she is "made over." Much improved, three years, six months.

CASE XXXIV, R. M. G., M. Sixteen years. He has always been well, except for occasional attacks of indigestion, until fifteen and one-half years old, when he had a sore throat followed by cervical lymphadenitis. Shortly afterward a severe colitis developed and lasted about seven weeks, with the final development of pain in the right lower quadrant, which has persisted ever since. There has been no nausea or vomiting. Some loss of weight, color and stamina.

P. Ex.: He is tall, well developed, slender, and with fair color. Heart, lungs, gastric contents and stool: negative. Urine: 1023, trace albumin, trace acetone, hyaline casts. Abdomen: normal appearance; normal tympany. Tenderness: over sigmoid; marked over appendix; slight in mid-epigastrium.

X-ray series: Stomach: fish-hook type; average size; peristalsis good; almost empty at four hours. No ulcer. Duodenum: apex somewhat fixed; cap normal; no sign of ulcer; some puddling in dependent portion with moderate reverse peristalsis. Slight ileac stasis. Cæcum: moderately dilated. Appendix: visualized throughout examination and tender on pressure. Hepatic flexure: some angulation; fixed high. Pre-operative diagnosis: Hepato-duodenal membrane. Pericolic membrane. Chronic appendicitis. Possible duodeno-jejunal obstruction.

Operation: 6-17-18. Incision: T. R. R. Two and five-tenths cm. above navel. Findings: Stomach: very much enlarged; pushed over into right side; bent back, in and up to duodenum. Otherwise pylorus and stomach negative. Duodenum: apex fixed high and sharply kinked. No ulcer. Hepato-duodenocolic membrane: extended to fundus of gall-bladder and ran directly to hepatic flexure, which was held against gall-bladder and sharply kinked. Remainder of membrane ran to duodenum. Liver and gall-bladder: normal except for membrane. Duodeno-jejunal angle: negative. Pericolic membrane: covered cæcum and ascending colon almost to flexure; two thick bands; one just above cæcum, one just below flexure, causing compression. Cæcum: greatly dilated; very thin-walled, especially external pouch. Appendix: long; irregular calibre; adherent at tip. Kidneys normal. Procedure: Mobilization duodenum downward 5 cm. Mobilization cæcum and colon and hepatic flexure. Appendectomy and plication of cæcum. Convalescence: Uneventful except for cystitis on fourteenth day, which lasted four days.

Result: Perfectly well and strong in every way. Cured, three years, seven months.

CASE XXXV, C. B., M. Thirty-five years. He was well until about thirty years old, when without known cause he became profoundly neurasthenic with marked fear of going about alone, with tremors, perspiration, pallor, etc. Pulse was usually 72 to 80, blood-pressure 125 to 135 mm. even when he said he was about to faint. Had much vertigo. Careful physical examination could not detect a single physical thing that was wrong. During the next five years medical treatment, psychic treatment, rest cures, farm cures, etc., were tried seriatim

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with only temporary and slight improvement. His digestive system seemed to be working normally. At thirty-three years he began to have occasional discomfort in the right iliac fossa, becoming more frequent, then pain on moving right leg and hip. These troubles had become constant and annoying by the end of two years, and were associated with vertigo and much flatulence. Appetite was good and bowels slightly constipated. He had been completely disabled (as to work) for five years.

P. Ex.: He is of medium size, well developed, fat, rather pale, nervous and fearful. Heart, lungs, thyroid, urine: negative. Abdomen: moderately distended; wall quite fat; tympanitic everywhere, especially over stomach, which extended down to navel and over to right mammary line. Splashing was easily elicited. Tenderness: along outer edge of right rectus at and below the level of the navel; over the gall-bladder, causing also sticking pain in left upper abdomen. No distention of the cæcum could be made out.

X-ray series: Stomach: fish-hook type; lower border at lumbar iv; peristalsis active; empty in three hours; no indication of ulcer. Duodenum: apex at upper border lumbar ii prone, and lumbar iii erect. Cap well filled. No evidence of ulcer. Adhesions indicated about beginning transverse colon. Cæcum and appendix inverted and beneath liver. Appendix: tender during fluoroscopy. No gall-stones. Pre-operative diagnosis: Hepato-duodenal membrane. Chronic appendicitis. Inverted cæcum.

Operation: 6-19-18. Incision: T. R. R. Findings: Stomach: enlarged, crowding over to right side, then bending back, up and in to. Duodenum: fixed high and sharply kinked, and held firmly against proximal gall-bladder by hepato-duodenal membrane. Cæcum and appendix: inverted beneath liver; they have long mesenteries and are freely movable. Peritoneal membrane: involving upper half of ascending colon and crossing to beginning transverse colon, causing kinking and constriction at hepatic flexure. Cæcum and first part of colon bent up around the lower edge of membrane. Procedure: Mobilization of duodenum downward 5 cm. Mobilization of colon and hepatic flexure. Appendectomy. Cæcum tacked in normal position. Convalescence: Uneventful.

Result: With ups and downs he gradually became entirely free from his digestive disturbances and also from his neurasthenic troubles. He returned to business and was doing well. When at his best he contracted encephalitis lethargica. Even so, there has been no digestive disturbance of any kind. Digestive cure, three years, six months.

CASE XXXVII, A. J. M., F. Forty-four years. She has always been subject to some indigestion. When twenty-nine her first child was born; she was badly torn; had a marked prolapse. Her general condition ran down seriously and she lost forty pounds weight. When thirty-three years old she had complete perineal repair and laparotomy for ventral suspension. The appendix was removed at that time. Within a week she developed severe pain and distension on the right side of the abdomen and marked constipation. Ever since that time she has had constant pain in the right side of the abdomen and down the right leg, increased by exercise, and by constipation. Always a few hours after meals the cæcal region becomes distended with gas, which gurgles and starts severe pain in the abdomen and leg. Constipation is obstinate. She seldom has any trouble attributable to the stomach proper. She has become very irritable, nervous, her head is not clear, she fatigues easily, and is much disabled. Her periods are regular, scanty and short.

P. Ex.: She is of medium frame; quite overfat; pale; pasty and with flabby tissues. Nervous, erratic. Heart: shows distinct myocarditis but is working reasonably well. Blood-pressure, 110 mm. Lungs, urine, gastric contents and stool: negative. Blood: Hæmoglobin, 65 per cent.; red blood-cells, 4,000,000.

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Wassermann: negative. Abdomen: fat, very flabby, distended with gas, especially right side. No rigidity. Median scar above pubes. Tenderness: over middle of ascending colon; none over cæcum, gall-bladder, or mid-epigastrium. Pelvic examination: Stellate tear of cervix; cyst in anterior lip. Uterus: normal size; freely movable; slightly tender over fundus.

X-ray series: Stomach: marked fish-hook type; lowest point lumbar iv; peristalsis active; empty in three hours; no evidence of ulcer. Duodenum: apex at lower edge lumbar ii, standing and prone, i.e., fixed; sharply angulated. Cap: small, irregular, no evidence of ulcer. Cæcum and ascending colon: dilated; marked stasis at seventy-two hours, distortion toward the hepatic flexure, which was fixed high and in contact with duodenal cap, and showed marked angulation and constriction. Transverse colon: in every plate its shadow was fused with that of ascending colon from the flexure half way to cæcum and then turned at right angle to go to splenic flexure. It and descending colon were small (spastic?) throughout. Following the enema the same conditions were present and after evacuation cæcum and colon still retained much barium. Gall-bladder: no sign of stones. Pre-operative diagnosis: Hepato-duodenal membrane. Pericolic membrane. Post-operative adhesions.

Operation: 6-24-18. Incision: T. R. R. Six cm. above navel. Findings: Stomach: somewhat enlarged; crowded over to right; bent back, up and in, to duodenum. Hepato-duodeno-colic membrane: from fundus of gall-bladder directly to hepatic flexure holding the two in contact and angulating flexure; membrane then ran to duodenum, holding its apex high and sharply angulated beneath cystic duct; one thick band ran down across duodenum to near pylorus. Pericolic membrane: across ascending colon from just above cæcum nearly to flexure, causing compression and distortion. Omentum crossed ascending colon and fused with pericolic membrane. Adhesions: Cæcum to iliac fossa where appendix had been removed. Omentum to old median incision, in which adhesions some loops of small gut were caught. Pelvic organs: normal except for suspension of uterus. Kidneys: normal. Pancreas and duodeno-jejunal angle: negative. Procedure: Mobilization duodenum downward 7 cm. Mobilization cæcum, colon and hepatic flexure. Separation omental adhesions and freeing of coils of small gut. (Tissues all very friable.) Convalescence: Uncomfortable but uneventful. The twelfth day the pain in right leg began to disappear and on the sixteenth day ceased. On the twenty-first day had a normal spontaneous stool for the first time in several years. Two months after operation: no pain in abdomen; only occasional flatulence; had gained ten pounds.

Result: No pain; occasional flatulence and constipation. Color, appetite and general strength greatly increased. Much improved, three years.

CASE XXXIX, A. B., F. Twenty-eight years. For several years subject to bilious attacks, and to pain, distention and belching after meals. Often had severe cramping in lower abdomen, but none since twenty-six years old. Appetite always good. Constipation always. Periods began at thirteen, regular, three and one-half days, moderate, no pain. Always easily fatigued.

P. Ex.: She is large, fat, pale. Heart, lungs, urine: negative. Abdomen: is prominent; very tympanitic, especially over colon, and stomach which seems to reach level of navel. Tenderness: over appendix; over gall-bladder region; and in mid-epigastrium. Pelvic examination: negative.

X-ray series: Omitted for reasons. Pre-operative diagnosis: Hepato-duodenal membrane. Pericolic membrane. Chronic appendicitis. Gall-stones(?).

Operation: 11-14-18. Incision: T. R. R. Three cm. above navel. Findings: Stomach: somewhat enlarged, otherwise normal. Hepato-duodenal membrane from fundus and whole of gall-bladder to pylorus and up duodenum to its apex which was held fast and angulated just beneath the cystic duct. Pericolic mem-

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brane: running upward and inward across colon just above cæcum. Appendix: very long, angulated; irregular in calibre. Liver and gall-bladder: normal, except for membrane; no gall-stones. Hepatic flexure: normal. Kidneys and pelvic organs: normal. Procedure: Mobilization duodenum downward 5 cm. Mobilization colon. Appendectomy. Pathological report: Chronic appendicitis. Convalescence: Uneventful.

Result: Occasional pain; considerable flatulence; some constipation. Appetite good; no restrictions in diet. Much improved in color and in general strength. Much improved, three years, six months.

CASE XL, E. S., F. Forty-six years. Perfectly well and strong until eighteen years old, when she had typhoid. When twenty-one years old she had severe abdominal pain, sharp, radiating to left shoulder and lasting half an hour. Similar attacks came twice a day for a week. Following the pain came nausea. The next bad attack came ten years later when she was thirty-one, and thereafter attacks recurred at irregular intervals, becoming constantly more frequent and more severe. By the time she was forty-one the pain was so aggravated by walking, or other exercise, that she became sedentary. Of late the attacks are associated with marked flatulence, nausea, and diarrhoeal tendency. Also temperature frequently accompanies them, varying from 101 to 105 F. Appetite has been good until lately. Marked loss of strength has occurred in last few months. Subject to occipital headache. Finger joints have enlarged and are painful, Lately the pain has focussed more in the right hypochondrium. There never has been any jaundice, urinary or menstrual disturbance. She is seriously disabled.

P. Ex.: She is of large frame, well developed, well nourished, somewhat pale. Heart, lungs, urine and stools: normal. Abdomen: normal in appearance; respiration is thoracic and abdominal breathing obviously painful. Pressure anywhere over abdomen causes gurgling of gas. Stomach tympany goes to 5 cm. above navel. Tenderness: marked at edge of right rectus on level A. S. S.; over cæcum and ascending colon; especially over gall-bladder, and along transverse and descending colon. Tympany: exaggerated everywhere except just below eighth and ninth right cartilages where there is dulness.

X-ray series: Stomach: fish-hook type, lower edge at lumbar v; peristalsis good; no sign of ulcer; empties in normal time. Duodenum: apex; lower border lumbar i prone, lumbar ii erect; angulated; no sign of ulcer. Descending limb appears to be held to liver by adhesions. Cæcum and beginning ascending colon: dilated; show stasis 48 hours. Appendix: not visualized. Hepatic flexure: narrowed; angulated. Diverticulitis: transverse and descending colon. Incompetency of ileoceleal valve. Gall-bladder: enlarged. Pre-operative diagnosis: Hepato-duodenal membrane. Peritoneal membrane. Chronic appendicitis. Cholecystitis—calculi. Diverticulitis coli.

Operation: 12-20-18. Incision: T. R. R. Four cm. above navel. Findings: Stomach: slightly enlarged; otherwise normal. Duodenum: apex fixed high and angulated. Gall-bladder: dilated; 4 cm. beyond edge of liver; very tense; containing large calculus at outlet. Cystic duct very small; common duct dilated. Liver: normal. Hepato-duodenal membrane: much thickened and running from proximal half of gall-bladder to duodenum. Pancreas: normal. Cæcum: dilated and thinned. Peritoneal membrane: crossing just above cæcum and extending nearly to flexure and compressing ascending colon. Hepatic flexure: free. Appendix: small, atrophic. Diverticulitis: transverse and descending colon and sigmoid. Multiple small fibroids. Procedure: Cholecystectomy: liver bed covered peritoneum, stump of cystic duct buried beneath peritoneum. Mobilization duodenum 6 cm. Mobilization colon. Appendectomy. Closed without drainage. Convalescence: Uneventful except for vomiting the first forty-eight hours.

Result: Some pain, but never severe. Flatulence frequently. Tendency

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to constipation; laxative every third night. Appetite very good. Some restrictions of diet. Gained ten pounds and much in strength and endurance. Much improved, three years.

CASE XLI, G. F., F. Thirty-two years. Always had trouble with flatulence and belching of gas, and constipation, but usually no pain. Once a month, usually with her periods, she has a bilious attack, headache, vomiting, etc., lasting one day. Periods regular, three days, profuse, with much pain. Appetite is good. She has always been pale, but more so lately. Always markedly constipated. Dyspnea on exertion; fatigues easily. In October, 1918 (thirty-two years old), with her bilious attack, she developed sharp pain and tenderness in right iliac fossa. Pain lasted one day, tenderness five days, since when it has diminished but never disappeared.

P. Ex.: She is tall, of large frame, fairly nourished, but quite pale and pasty. Weighs 118 pounds. Heart: normal, except for blowing murmur over left second space. Pulse: 96 (nervous), regular, and of fair quality. Lungs and urine: negative. Abdomen: distended; markedly tympanitic. Stomach: tympany and splashing down to navel and well over to the right side. Marked tenderness at outer border of rectus on line from R. A. S. S. to navel.

X-ray series: Stomach: fish-hook type; lower edge below sacral promontory; peristalsis active; considerable six-hour retention; no sign of ulcer. Duodenum: apex fixed at upper level of lumbar III in both prone and erect postures. Cap shows no deformity but is small; slight puddling and reverse peristalsis in dependent duodenum. Cæcum and ascending colon: dilated; marked stasis. Hepatic flexure: at iliac crest; shows some narrowing and angulation. Appendix: visualized throughout examination. Ileocæcal valve: incompetent. Pre-operative diagnosis: Hepato-duodenal membrane. Pericolic membrane. Chronic appendicitis.

Operation: 1-15-19. Incision: T. R. R. Two cm. above navel. Findings: Stomach: much enlarged; over in right side, bent back, up and in to duodenum; no ulcer. Duodenum: apex fixed high and kinked sharply. Hepato-duodenal membrane: from cystic duct and proximal gall-bladder (narrow and 3 cm. long) to apex of duodenum. Duodeno-jejunal angle: normal. Pancreas: normal. Gall-bladder: long but normal, except for membrane. Liver: normal. Cæcum: much dilated; thin; pale; adherent to iliac fossa. Appendix: long segmented; irregular; adherent. Pericolic membrane: thick, firm; compressing colon from cæcum about two-thirds of distance to hepatic flexure. Right edge of omentum crossed colon obliquely above cæcum to membrane, and caused deep oblique compression of ascending colon. Hepatic flexure: adhesions between the two limbs, causing sharp angulation. Multiple small fibroids. Ovaries small and cystic. Procedure: Mobilization duodenum; cæcum; colon and hepatic flexure. Appendectomy. Cæcum plicated. Convalescence: Uneventful. On the twenty-first day could eat more food with less discomfort than for years.

Result: Occasional slight pain but in lower abdomen and different from old pain; slight flatulence; slight constipation; laxative twice a week. Appetite very good; can eat everything. Color improved; has great improvement in strength but is not entirely well. Much improved, two years.

CASE XLIII, L. W., F. Thirty-three years. Perfectly well until twenty-two years old, when she began to have attacks of abdominal pain about twice a year, lasting a few days. When twenty-five years old she had a severe attack with nausea and vomiting. Shortly afterward her appendix was removed. Until twenty-eight years old she was free from pain and indigestion, but then began to have attacks of sharp epigastric pain several hours after meals, coming at irregular intervals. Abstention from food caused no change in the pain. It was very likely to follow periods of nervous tension. These pains ceased at thirty years, but were followed by dull aching pain, with much gas distention and tenderness,

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especially on the right side. Enemata caused temporary relief. These attacks are associated with no temperature, and rarely with nausea. There is a dragging sensation in epigastrium, relieved by bending forward. Constipation persistent. There is lassitude, memory defect, mental inertia; sleep disturbed by dreams, and unrefreshing. Used to have tonsillitis, but not for several years now. Periods used to be irregular and painful but not since thirty-one years of age. Her weight has not varied. Disability is marked; 60 to 75 per cent.

P. Ex.: She is of medium size, well nourished, of good color. Heart, lungs, urine: negative. Tonsils: small, negative. Abdomen: normal appearance; oblique appendix scar on right side, not very sensitive; very tympanitic all over, but especially over cæcum and up to the level of iliac crest. Pressure over cæcum elicits tenderness, gurgling, fulness, extending up to iliac crest. It also causes shooting pains all over the abdomen. No tenderness above level of iliac crest on right side, nor over gall-bladder. Moderate tenderness in mid-epigastrium and over sigmoid, which was spastic. Kidneys: negative.

X-ray series: Stomach: fish-hook type; lower border at sacral promontory in erect posture; peristalsis hypertonic; empty at three hours. Spot on middle of lesser curvature suspicious of penetrating ulcer, but it caused no defect in peristalsis. Duodenum: apex; prone at level lumbar i; not angulated; cap, normal. Erect at level lower edge lumbar ii, but angulated; cap smaller and elongated. Dependent duodenum shows slight puddling. Ileac stasis: moderate. Cæcum: much dilated; somewhat prolapsed. Ascending colon: dilated below; somewhat narrowed near flexure. Hepatic flexure: close up to duodenum cap; some angulation. Marked retention in cæcum and ascending colon. Ileocæcal valve: incompetent. Gall-bladder: shadow enlarged; no calculi. Pre-operative diagnosis: Hepato-duodenal-colic membrane. Pericolic membrane. Cholecystitis (?). Duodeno-jejunal obstruction (?).

Operation: 1-31-19. Incision: T. R. R. Just above navel. Findings: Stomach: slightly if at all enlarged; no evidence of ulcer on lesser curvature. Duodenum: fixed high, angulated and compressed. No ulcer. Hepato-duodenal-colic membrane: much thickened, starting three cm. back of fundus, running from gall-bladder and cystic duct down to duodenum, across its first portion and on to hepatic flexure. The anterior edge was very thick and rigid and about 0.5 cm. in diameter. It caused marked kinking and compression of duodenum and high fixation and kinking of the flexure. Liver and gall-bladder: normal, except for membrane. Duodeno-jejunal angle and pancreas: normal. Cæcum: much dilated; thin, pale, adherent posteriorly. Pericolic membrane: dense; crossing colon just above cæcum and extending almost to flexure, and causing visible compression. Terminal ileum: normal. Pelvic organs: normal, except that right ovary was fibrotic. Kidneys: normal. Procedure: Mobilization duodenum downward 4 cm. Mobilization colon, cæcum and hepatic flexure. Plication of cæcum. Convalescence: Uneventful.

Result: No pain; slight flatulence; slight constipation; appetite good; eats wide variety. Gained weight; gained enormously in strength and capacity to work both mentally and physically. Much improved, three years. Practically cured.

CASE XLV, H. L. B., M. Forty-eight years. Perfectly well until sixteen years old, when he had sudden pain in left upper abdomen, vomiting and marked constipation. After three days in bed he recovered but has never since felt really well, because of frequent attacks of sour stomach, flatulence, constipation with constant sense of fatigue and lack of rest from sleep. Dieting has prevented the sharp attacks of pain, but he feels wrong in the abdomen all the time. Feels as if an obstruction were in the left upper abdomen. When forty-six he had high blood-uric-acid and high pressure. Under good medical supervision they decreased

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to about normal. His constant disturbance disables him considerably. He leads an out-door life.

P. Ex.: He was a large, well-nourished, florid man. Heart, lungs, and urine: normal. Gastric contents: hyperacid. Stools: negative. Abdomen: distended; tympanitic, especially over ascending, transverse colon and stomach. Tenderness is entirely absent. Small umbilical hernia. He points to just beneath tenth left costal cartilage as the area of subjective discomfort, but no objective findings are there.

X-ray series: Stomach: fish-hook type; swings well over to right; lowest part at lumbar v; peristalsis active; empty in four hours. No evidence of ulcer. Duodenum: apex at level upper part lumbar ii, erect, and lower part lumbar i, prone, *i.e.*, marked fixation. Cap is well filled. No ulcer. No puddling in dependent part. Hepatic flexure: fixed and angulated close to duodenal cap. Cæcum and ascending colon: dilated; show stasis after forty-eight hours. Appendix: large, visualized throughout; not tender. Transverse colon: left half showed a marked constriction, spasmodic because of filling later with enema. Ileocæcal valve: incompetent. Pre-operative diagnosis: Hepato-duodenal membrane. Pericolic membrane. Chronic appendicitis.

Operation: 2-20-19. Incision: T. R. R. Two cm. above navel. Findings: Stomach: quite large; pushing well into right flank; otherwise negative. Duodenum: apex fixed high and sharply compressed and kinked; no ulcer. Duodeno-jejunal angle: negative. Appendix: 12 cm. long; dilated; with fibrous cord for tip. Adherent near base. Cæcum: much dilated; filled with semisolid faeces. Pericolic membrane: crossing colon from just above cæcum to about half way to flexure; contained several thickened bands. Hepatic flexure: directly adherent to fundus of gall-bladder by membrane; and to under surface of liver by connective-tissue cord; markedly angulated and constricted. Flexure and ascending colon filled with semisolid faeces. Transverse colon: negative. Splenic flexure unusually high. Hepato-duodeno-colic membrane: holding hepatic flexure to fundus of gall-bladder; passing to lower anterior surface of duodenum; up across its front to the apex which was fixed high and back, and was compressed and angulated. Liver and gall-bladder: negative except for membrane. Procedure: Mobilization duodenum downward 8 cm. Mobilization colon. Appendectomy. Repair umbilical hernia.

Result: Fifth day; died of pneumonia.

CASE XLVI, A. G., F. Thirty-one years. Very well until twenty-two years, when she had keratitis and glaucoma (probably specific). When twenty-seven years, after hard climbing, had severe pain in right upper abdomen; then perfectly well until thirty-one years old, when she had sudden pain in the same place, with much flatulence and constipation. Since then there has always been indigestion, with frequent attacks of distention and constipation. Occasionally vomits very sour stuff half an hour after eating. Constipation very marked. Her periods cause aggravation of digestive troubles. She is very nervous and fatigued. Has lost ten pounds in last four months, and is almost completely disabled.

P. Ex.: She is large, very fat, and ruddy. Mouth, throat, lungs, heart, urine: normal. Pulse 80. Abdomen: wall is fat; tympanitic all over, but most in right upper quadrant; tender all along large gut, but more over cæcum and ascending colon, and most over the flexure and gall-bladder.

X-ray series: Stomach: fish-hook type; dilated; well over in right side. No sign of ulcer. Duodenum: apex at level lower lumbar i, prone, and middle of lumbar ii, erect (marked fixation). Angulated; no sign of ulcer. Hepatic flexure: close up to duodenal cap; angulated; the two limbs in contact for some distance. Cæcum: dilated; diameter fifty per cent. greater than upper ascending

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colon, which is somewhat constricted. Pre-operative diagnosis: Hepato-duodenocolic membrane. Pericolic membrane. Chronic appendicitis.

Operation: 2-22-19. Incision: T. R. R. Three cm. above navel. Findings: Stomach: dilated; well over in right side, otherwise negative. Duodenum: apex held high and kinked by an unusually short and rigid gastro-hepatic omentum. Otherwise negative. Liver and gall-bladder: normal; no adhesions and no membrane. Duodeno-jejunal angle: normal. Caecum: dilated; thin walled. Appendix: much congested; contained concretions. Pericolic membrane: crossing just above caecum and extending up to hepatic flexure, having thickened bands, above causing kinking and constriction of flexure, and in middle and lower edge causing constriction of ascending colon. Omentum: also attached to upper ascending colon, causing condition seen in picture. Kidneys: normal. Pelvic organs: infantile; left ovary was a cyst 5 to 7 cm. in diameter, freely movable. Procedure: Mobilization duodenum 3 cm. Mobilization caecum, colon and flexure. Appendectomy. Convalescence: Uneventful.

Result: No pain; occasional flatulence and constipation. Appetite very good; can eat everything. Gained weight and very much in strength. Much improved, two years, ten months. (Almost cured.)

CASE XLVIII, M. V., F. Twenty-five years. Always subject to violent headaches, sometimes associated with bilious attacks, more often not. Always some digestive disturbance, but since twenty-one years old has been definitely distressed in upper abdomen with no definite relation to food. It could frequently be started by playing tennis or any other violent arm exercise. When twenty-four had influenza. Since then extremely tired; has lost weight, but there has been no increased digestive disturbance. Always badly constipated. Has constant sense of discomfort in upper abdomen. Periods irregular, prolonged, profuse, with great pain. Tonsils removed when twenty-three because of frequent sore throat.

P. Ex.: She is tall, thin, pale, pasty and with acne. Mucous membranes are very pale. Teeth: irregular, but healthy. Some remnants of tonsil remaining. Heart, lungs, urine: normal. Pulse 72, fair quality. Abdomen: normal to inspection, markedly tympanitic all over. Tenderness: marked over appendix, over gall-bladder and especially just to the right of mid-epigastrium. This last spot has always been tender and there is present some muscle resistance. Elsewhere no tenderness. Pelvic examination shows cervix eroded from discharge. Uterus: retroflexed, retroverted, not tender, freely movable. No tenderness in either fornix. Pre-operative diagnosis: Hepato-duodenal membrane. Pericolic membrane. Chronic appendicitis. Displaced uterus.

X-ray series: Stomach: fish-hook type; lower border of greater curvature, prone, at lower lumbar iii; erect, at lower lumbar iv. Duodenum: apex, at level of lower border lumbar i, erect position. At upper border lumbar i, prone. Cap deformed in both positions. No sign of ulcer. Second portion narrowed and flattened. Marked six-hour retention. Caecum: dilated; shows retention beyond ninety-six hours. Appendix: visualized throughout examination. Ascending colon: constricted near upper end. Hepatic flexure: fixed at level of upper border lumbar iii. Angulated. Transverse colon: prolapsed; runs in contact with ascending colon half way to caecum. Kidneys and gall-bladder region: negative.

Operation: 4-22-18. Incision: T. R. R. Two cm. above navel. Findings: Stomach: somewhat enlarged, pushed over to right of median line. Duodenum: apex, fixed high, definitely angulated. Pylorus, stomach, duodenum: show no intrinsic disease. Duodeno-jejunal angle: normal. Pancreas: normal. Terminal ileum: normal. Caecum: dilated. Appendix: adherent; 8 cm. long; angulated; distended. Pericolic membrane: crossed middle of ascending colon from above downward, causing slight constriction but allowing hepatic flexure to fall over

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it and cause pressure volvulus. Hepato-duodenal membrane: not present, but gastro-hepatic omentum at right edge quite short and thickened, causing high fixation and distinct angulation of duodenum. Gall-bladder: somewhat large and distended; otherwise normal. Liver: normal. Kidneys: normal. Pelvic organs: Uterus, small, retroverted, retroflexed, freely movable, easily placed in normal position. Procedure: Mobilization duodenum. Mobilization colon. Appendectomy. Convalescence: Uneventful. Made rapid progress; great improvement in color and in strength during hospital stay. Pathological report: Chronic atrophic appendicitis.

Result: No pain; no flatulence; slight constipation; excellent appetite, eats everything; has gained much weight and color and is perfectly well as to general health and capacity for work. Cured, two years, eight months.

CASE L, C. O., F. Twenty-eight years. Perfectly well until twenty-one years of age, at which time, after losing weight and strength without any definite reason, she had a sense of fulness and weight in the epigastrium after eating, also anorexia. She has never been constipated but has a tendency the other way. Similar disturbance came at irregular intervals, and lasted for varying periods. When twenty-eight years old she had an attack in which pain and diarrhoea were added. These attacks became more frequent and persistent and she never felt well any of the time for the last seven months before operation. She lost ten pounds and afternoon temperature frequently reached 100° F. A morning cough now and then has been associated with a little bloody sputum. She is almost completely disabled.

P. Ex.: She is small, thin and pale. Mouth and throat: negative. Sputum: negative. Chest has been repeatedly negative. Pulse: 110, regular, fair quality. Heart: negative. Urine: normal. Abdomen: normal on inspection and percussion. Tenderness: marked over appendix, hepatic flexure and in median line 5 cm. above navel.

X-ray series: Chest shows evidence of tubercular involvement but not extensive. Stomach: marked fish-hook type, much enlarged. Duodenum: Apex at level lumbar 1; angulated; cap deformed but not suggestive of ulcer; dependent duodenum slightly distended. Caecum: dilated; shows marked stasis. Appendix: large, irregular; retains barium forty-eight hours. Ascending colon: much narrowed near hepatic flexure. Pre-operative diagnosis: Hepato-duodenal membrane. Peritoneal membrane. Chronic appendicitis.

Operation: 10-25-19. Incision: T. R. R. Just above navel. Findings: Stomach: somewhat enlarged but otherwise normal. Liver and gall-bladder: normal. Duodenum: first portion normal; no membrane to gall-bladder, but a peritoneal fold ran upward from descending duodenum to the under surface of liver well to the right of gall-bladder. Pulling stomach down would develop a kink in duodenum where the fold was attached. Duodeno-jejunal angle: normal. Peritoneal membrane: covered upper caecum and ascending colon to the flexure, causing marked constriction at upper end. Appendix: adherent; angulated; greatly distended. Kidneys: normal. Pelvic organs: normal, except for cyst of left ovary 6 x 4 cm. Procedure: Mobilization duodenum. Mobilization caecum and colon. Appendectomy. Convalescence: Normal, except for temperature from 100.6 to 101° F., from fifteenth to twenty-third days, for which no reason could be found in urine, chest or wound. Appetite improved; digestion was comfortable and she was feeling well in spite of temperature.

Result: Occasional pain and flatulence; bowels regular; appetite good; eats everything; gained eighteen pounds. General health and endurance greatly increased. Cured, two years, two months.

CASE XXI, C. L. G., F. Twenty-six years. Has always been constipated; no associated headaches, bilious attacks or sour stomach until present illness.

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Periods started at fourteen years, always regular without pain. When twenty-two years old had a cold in head with fever and nausea, no pain. On getting up felt extreme fatigue, vertigo and pulse was only sixty. Felt sudden gripping sensations just above and to the left of navel. During the following year sour stomach, sour eructations have been frequent and getting steadily worse. Constipation has been much aggravated. She has occasional headache, is very irritable. Has cold hands and feet. Pulse even as low as fifty-one. Gets easily exhausted, either by exercise or any excitement. Has only moderate pain and slight flatulence. She is completely disabled.

P. Ex.: She is a woman of medium size, well nourished with high color (excited). Heart, lungs, urine, etc., negative. Abdomen: normal in appearance, tympanitic throughout. Marked tenderness 5 cm. above navel to left of median line. Very slight tenderness in the appendix region. No tenderness over gall-bladder or in mid-epigastrium.

X-ray series: Stomach: fish-hook type; lower border at level of lumbar iv, peristalsis active. No deformity. No sign of ulcer. Large six-hour retention. Duodenum: cap moderately fixed beneath liver, not tender, average size. No sign of ulcer. Duodeno-jejunal angle: fixed at level of lumbar ii with reduction in diameter of terminal duodenum, marked dilation of dependent duodenum. Appendix: not visualized. No evidence of disturbance of cæcum or ascending colon, which were somewhat prolapsed. There was some regurgitation through the ileo-colic valve from the enema. Pre-operative diagnosis: Duodeno-jejunal angle obstruction. Hepato-duodenal membrane(?)

Operation: 2-26-18. Incision: T. R. R. Three cm. above navel. Findings: Stomach and pylorus: normal. Duodenum: apex, high and kinked. Gall-bladder: somewhat enlarged, otherwise normal. Hepato-duodenal membrane: running from proximal end of gall-bladder and cystic duct to apex of duodenum. Liver: normal. Duodeno-jejunal angle: pulled upward and to the left by a fold of peritoneum, angulated and turned forward and to right in front of superior mesenteric vessels 2 cm. and there caught by a fold of peritoneum which pulled it strongly upward and to the right. The jejunum then turned sharply downward to the left. There was thus formed a Z-shaped distortion with very marked double angulation, causing very obvious obstruction. Cæcum and ascending colon: appeared normal. No sign of pericolic membrane or of obstruction of the colon. Appendix: very long and narrow, showing no signs of inflammation. Pelvic examination: showed uterus normal, except for one small fibroid in the lower posterior segment. Left tube was hydrosalpinx about 2 cm. in diameter. It was freely movable. Both ovaries: normal. Kidneys: normal. Procedure: Mobilization of duodenum. Mobilization of duodeno-jejunal angle (plastic). Appendectomy. Convalescence: Uneventful.

Result: Three years, ten months. No pain; slight flatulence. Appetite good, eats everything. Has gained only three pounds in weight, but has entirely regained vigor and endurance. Much improved, three years, ten months. (Practically cured.)

CASE XXXI, J. W., F. Seventeen years. Perfectly well until three years old, when typhoid fever developed. After that had bronchitis, la grippe, chicken-pox. Ever since that time she has had much digestive disturbance, anorexia, constipation, loss of weight, flatulence, discomfort after small amounts of food, severe headaches and great nervous depression with loss of stamina. When sixteen and one-half years old she had bad bronchitis, followed by mumps; later had measles and many attacks of epistaxis. After meals she has frequency of micturition with some burning, almost no endurance; pain usually comes definitely two hours after eating, is eased by lying down. Hands and feet are always

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clammy, and she is almost completely disabled. Her periods are regular at five weeks, profuse and with much pain. Bed-ridden at this time.

P. Ex.: Tall, thin, fairly nourished, but has fair color. Pulse 72, good quality. Heart, lungs, urine, stool: negative. Haemoglobin, 81 per cent.; red blood-cells, 4,740,000. Abdomen: retracted, showing but little flatulence. Stomach: percusses to median line and down to navel. Sigmoid: spastic and tender. Marked tenderness and resistance 3 cm. above navel, just to the left of mid-line. Marked tenderness below right rectus just above level of R. A. S. S. No tenderness over gall-bladder, nor in mid-epigastrium.

X-ray series: Stomach: marked fish-hook type. Greater curvature in true pelvis. Peristalsis: active. No indication of ulcer. Six-hour retention. Duodenum: apex, level of lumbar iv. Cap normal; no sign of ulcer. Descending limb and dependent duodenum filled easily; dilated markedly, showing reversed peristalsis and writhing, and tenderness over the angle. Some stasis in cæcum and ascending colon. At forty-eight hours entire colon was still visualized. Appendix was visualized throughout examination. Hepatic flexure: quite movable; sometimes below, sometimes above iliac crest. Ileocæcal regurgitation. Pre-operative diagnosis: Duodeno-jejunal angle obstruction. Chronic appendicitis.

Operation: 5-30-18. Incision: T. R. R. Just above navel. Findings: Stomach and duodenum: normal. Gall-bladder: normal. Duodeno-jejunal angle: showed firm, strong band running upward and to the left, pulling the angle well out and up, causing sharp angulation and constriction by membrane pressing in front of angle. When this band was divided the angle came downward and the duodenal contents very promptly passed the obstruction. There was no evidence of obstruction by mesenteric vessels. Beneath the peritoneum about the mesenteric vessels were several enlarged lymph-glands of which one was removed for examination. The overlying peritoneum was also somewhat thickened. Terminal ileum: negative. Cæcum: was located on a level with the crest of the ilium. It was somewhat dilated. Pericolic membrane: Broad and thick, covered the entire cæcum, ascending colon, hepatic flexure and beginning transverse colon. It caused general compression and some angulation. It showed two thickened bands passing across the mid-portion of ascending colon. There was also a band running from beginning transverse colon up to pyloric antrum of stomach, holding the two firmly in close contact. Appendix: 10 cm. long, rather small calibre, irregular with fairly long mesentery. Beneath the peritoneum in the ileocæcal angle were many lymphatic glands, of which one was removed for examination. Pelvic organs: normal, except for ovoid cyst at fimbriated end of right tube. Kidneys: normal. Spinal column came unusually far forward. Procedure: Mobilization duodeno-jejunal angle. Mobilization cæcum, ascending and transverse colons. Appendectomy. Lymphadenectomy. Removal fimbriated cyst. Pathological report: Calcified lymph-node. Chronic appendicitis. Convalescence: Uneventful.

Result: Three years, seven months. Improved. No pain; some flatulence; some constipation; fair appetite, eats everything. No gain in weight. Improvement in general health and strength. Still troubled with lassitude. Improved, three years, seven months.

CASE XXXVI, C. H., F. Forty-five years. As a child had "inflammation of the bowels" for a few weeks. Ever after there was such digestive disturbance that she was not expected to live. She has always had considerable digestive disturbance. When forty-one digestion became very much worse and ever since has given increasing trouble. Attacks are characterized by sudden excess of flatulence, distention and severe pain, often with nausea and vomiting, and great loss of strength; marked constipation, but as far as she knows there has been no fever. About four months before operation, during an attack, the appendix

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region was extremely tender to pressure. Since forty-two years of age there have never been any normal movements and the taking of medicine has caused temporary diarrhoea, so there has been serious trouble in the regulation of the bowels.

P. Ex.: She is tall, fairly well nourished, but dragged out, pasty and pale in appearance. She is extremely nervous. Teeth: in bad condition; much pyorrhœa. Tonsils: show infection. Heart, lungs, urine: negative. Abdomen: normal to inspection. Markedly tympanitic everywhere. Moderate tenderness over the appendix region, to less extent over the cæcum. No tenderness over hepatic flexure, gall-bladder, or in the epigastrium.

X-ray series: Not taken for reasons. Pre-operative diagnosis: Pericolic membrane. Chronic appendicitis.

Operation: 6-19-18. Incision: T. R. R. Two and five-tenths cm. above navel. Findings: Stomach: considerably enlarged and pushed over to right side, otherwise normal. Duodenum: normal; no fixation. Gall-bladder and liver: normal. Duodeno-jejunal angle: normal. Cæcum: very greatly distended, thin and pale. Appendix: 12 cm. long, 1 cm. in diameter. Kidneys: normal. Pericolic membrane: dense, thick, upper edge being much thickened, holding hepatic flexure high, causing angulation and very marked constriction. The lower edge was also thickened and crossed ascending colon slightly below its middle. Pelvic organs: normal. Procedure: Mobilization colon. Appendectomy. Plication of cæcum. Convalescence: Uneventful.

Result: Two years, four months. Improved. Some pain and flatulence. Occasional constipation. Appetite good, eats everything. Color and general endurance greatly improved. (Still has infected teeth and tonsils.) Improved, two years, four months.

CASE XXVI, D. C., F. Twenty-six years. Usually pretty well, always marked constipation since childhood. Periods began at fourteen, always perfectly regular, painless. Always extremely nervous. When twenty-two years old had an attack of "appendicitis," also two when twenty-three years old and one when twenty-four. During the time between twenty-three years and twenty-four years old there were a number of attacks of abdominal pain associated with inability to flex the right hip. When twenty-four constipation became worse than ever and there was much pain, flatulence, marked lassitude, headache and general discomfort. Restrictions in diet caused marked improvement. In November, 1916, twenty-four years old, there was an attack of pain and tenderness over the appendix, but without vomiting or fever. Every few months since there have been similar attacks. They are becoming more frequent until now the interval is only ten to fourteen days. With the final attack at twenty-six years of age, for the first time there was vomiting and definite localized tenderness. There was no fever and no increased leucocytosis. Her general health and endurance have depreciated so that she is practically completely disabled.

P. Ex.: She is tall, well formed, fairly nourished, pale, extremely nervous. Heart, lungs, urine, gastric contents: negative. Pulse 80, of fair quality. Abdomen: anterior wall slightly retracted; moderately tympanitic everywhere. Tenderness over sigmoid, which was slightly spastic. No tenderness in epigastrium, over gall-bladder or over ascending colon. Cæcum: felt to be somewhat thickened and distended and tender. Sharply circumscribed tenderness over appendix region.

X-ray series: Omitted. Pre-operative diagnosis: Chronic appendicitis. Pericolic membrane(?)

Operation: 5-11-18. Incision: Intermuscular; right side, Weir modification. Findings: Transverse colon: markedly prolapsed. Cæcum: adherent to iliac fossa, fixed by definite pericolic membrane. Appendix: small, fibrous, distended

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near tip. Covered also by extension of pericolic membrane. Pericolic membrane: covering appendix, cæcum and ascending colon where there was a firm, thick fold which caused definite compression and distortion. Another band ran obliquely downward across the hepatic flexure, causing angulation. Gall-bladder: normal in appearance and feeling. No hepato-duodenal membrane could be made out. Pylorus and duodenum passed under fundus of gall-bladder. Pelvic organs: normal. Procedure: Mobilization of cæcum and colon. Appendectomy. Convalescence: Uneventful.

Result: One year, eight months, much improved. Some pain and flatulence. No constipation. Appetite good. Gained thirty pounds in weight and improved much in general strength. Much improved, one year, eight months.

CASE XXXVIII, J. T. S., M. Forty-six years. For fifteen years has had marked digestive disturbances. Was treated at various times for hyperacidity, ulcer, etc. Troubles are getting worse with occasional improvement. Chief difficulty is pain and distress after food; heart-burn, sense of heaviness and discomfort, profound fatigue and headaches. There has been some loss of weight. Very marked disability. There is always mental inertia, some confusion and little capacity for brain work. Constipation is usually present. Marked flatulence. There is dull pain at level of navel which is not influenced by food. On the whole, his troubles are becoming worse rather than better.

P. Ex.: He is a tall, well-developed man; thin, sallow looking and with the appearance of constant suffering. Pyorrhœa and foul breath are obvious. Heart, lungs, urine, stool: negative. Abdomen: somewhat prominent, although there is no fat. It is markedly tympanitic everywhere. Stomach: enlarged down to umbilicus and over into the right side. Splashing is readily obtained at any time. Sigmoid: spastic and moderately tender. Moderate tenderness over appendix region. Otherwise examination was negative. Gastric analysis shows nothing of interest except hypersecretion and hypermotility.

X-ray series: Stomach: fish-hook type; within average size. peristaltic waves quite active; occasional pylorospasm, no sign of ulcer. Duodenum: Cap filled promptly; normal in size and appearance. No indication of ulcer. It is fixed and somewhat angulated. Dependent duodenum: Showed some dilation, marked reverse peristalsis with writhing, twisting, very suggestive of obstruction at the duodeno-jejunal angle. Remainder of series not permitted. Pre-operative diagnosis: Obstruction at duodeno-jejunal angle. Chronic appendicitis(?)

Operation: 6-16-18. Incision: T. R. R. Just above navel. Findings: Stomach: enlarged; pushed over to right side. Hepato-duodenal membrane: ran from proximal gall-bladder and cystic duct to front of first portion of duodenum, causing fixation and angulation at apex of moderate degree. Duodeno-jejunal angle: shows fold of peritoneum running upward and to the left, causing elongation and definite kinking, also compression where the membrane crossed in front of the angle. There seemed to be no other disturbance in the neighborhood. Ileum: negative. Pericolic membrane: covered the whole length of cæcum and ascending colon, causing moderate compression. Upper edge showed firm, large band, causing marked angulation and compression of the hepatic flexure. There were also strong adhesions between ascending and transverse colons about 10 cm. from hepatic flexure. It aggravated the angulation of the hepatic flexure. Appendix: small; quite congested and bulbous near tip. Liver, gall-bladder, pancreas, kidneys: normal. No sign of ulcer in either the stomach or duodenum. Procedure: Mobilization duodenum. Mobilization colon. Mobilization duodeno-jejunal angle (plastic instead of anastomosis). Appendectomy. Convalescence: Uncomfortable. Extremely restless and nervous, asking for narcotics. Discharge from the wound on tenth day, healing completed on the twenty-eighth day.

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Result: Three years, six months, improved. Seldom has pain, no constipation. Appetite good, no limitation of diet. Endurance is definitely increased, but still troubled with lassitude. Improved, three years, six months.

CASE XLII, D. C., F. Twenty-two years. In good health until seventeen years old, but has always had occasional attacks of lower abdominal pain after over-eating. When seventeen definite attacks of pain occurred every few months; sharp, cramp-like in character, lasting from a few minutes to two hours; rarely associated with nausea, almost never with temperature. These attacks have been getting more frequent, more definite, more persistent. During the last six months she has been confined to bed for a few days with each of three separate attacks which were associated with nausea, vomiting and a temperature of 101.5. During the last six months she has been weak, very nervous, sleepless and almost completely disabled. There is marked flatulence; bowels have always had a tendency to be loose. Periods have always been normal. She has lost much in color; appetite is poor. Physician states she had tuberculous lesion of left upper lobe, which is now healed.

P. Ex.: She is tall, medium weight, well nourished, slightly pale. Lung shows healed lesion. Heart: normal. Rather nervous and irritable. Abdomen: normal in contour, tympanitic everywhere. Distinct tenderness over the appendix region. Slight tenderness over the gall-bladder; marked tenderness in mid-epigastrium. Urine and stools: negative.

X-ray series: Stomach: average size, fish-hook type, no sign of ulcer. Peristalsis: normal. Empty in three hours. Duodenum: apex; standing, at level of lumbar ii; prone, dorsal xii, shows distinct angulation. Cap, small, no deformity suggestive of ulcer. Dependent duodenum: slightly enlarged, no sign of obstruction. Cæcum and beginning ascending colon: markedly dilated. Upper ascending colon and hepatic flexure: high, narrow, sharply angulated. Transverse colon: apparently closely attached to upper ascending colon. Appendix: visualized throughout. Some regurgitation through the ileoçecal valve. Pre-operative diagnosis: Hepato-duodenal membrane. Pericolic membrane. Chronic appendicitis.

Operation: 1-16-19. Incision: T. R. R. Two cm. above navel. Findings: Stomach: appeared normal, no sign of ulcer. Duodenum: fixed high and kinked. Hepato-duodeno-colic membrane: ran from middle of gall-bladder to cystic duct, downward to first portion of duodenum onward to hepatic flexure, which was held high and angulated. Liver and gall-bladder: normal, except for membrane. Duodeno-jejunal angle: showed slight kinking by membrane running across its front and upward to the left. Cæcum and appendix: quite adherent to iliac fossa. Appendix: short, kinked, segmented with bulbous tip. Pericolic membrane: very thick; covered ascending colon from just above the cæcum nearly to hepatic flexure. This caused marked compression of ascending colon, especially at the upper end. Pancreas, kidneys: normal. Pelvic organs: normal, except for right ovary, which was somewhat enlarged, firm and prolapsed. Pathological report: Chronic appendicitis. Procedure: Mobilization duodenum, 5 cm. Mobilization colon. Mobilization duodeno-jejunal angle. Appendectomy. Convalescence: Uneventful, except for extreme nervousness and hysterical outbursts.

Results: After six months has gained fifteen pounds, feeling very well in every way. No pain except following over-eating. Is sometimes troubled with diarrhoea. Very little flatulence. Appetite good, can take almost any food. Has not regained her strength. About one year later she developed tuberculosis definitely and has since been at a sanitorium. Her digestive symptoms were, therefore, much improved during the early part of her post-operative period, but her later troubles have destroyed the value of the operation. Digestive result, after six months. Much improved.

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**CASE XLIX, N. M. A., F.** Thirty-six years. For eleven years she has had a great deal of trouble with constipation and some hemorrhoids. By careful attention to diet she got along fairly well. When thirty-three years old she had measles and was quite sick. This attack was followed by digestive disturbances, so that six months later her appendix was removed. When thirty-four years old she began having troublesome pains in the upper abdomen and left chest. No heart trouble could be found, but palpitation was constantly present when her pain was troublesome. Within a few months of the onset of these pains she had a complete breakdown. She has made some improvement, but is still distinctly neurasthenic. Trouble is getting to be more disturbing as time goes on. Bowels are markedly constipated. Now and then she has bleeding from the hemorrhoids and an occasional fissure forms. She has lost a few pounds in weight. From thirty-five on flatulence and abdominal pains have increased very much in frequency and severity and are now aggravated, especially in the right lower quadrant.

P. Ex.: She is of a small size, slender and quite pale. She has the appearance of prolonged suffering. She is almost completely disabled. Heart, lungs, urine: normal. Abdomen: normal in appearance. Shows appendix scar. There is tympany everywhere but it is most marked in the right lower quadrant, running upward toward the hepatic flexure. Cæcum and ascending colon: distinctly dilated, distended and are definitely tender. Moderate tenderness in the mid-epigastrum. Pelvic examination: shows ovarian tumor about 9 x 6 cm. Otherwise pelvic organs seem normal.

X-ray series: Stomach: marked fish-hook type. No sign of ulcer. Lowest border of stomach within true pelvis; marked six-hour retention. Duodenum: apex, lower border lumbar iii, erect; middle lumbar ii, prone. Sharp angulation; cap moderately filled; no sign of ulcer. Descending duodenum: at first narrow, then showing marked puddling of dependent portion. Six-hour retention in duodenum. Hepatic flexure: fixed at level of lumbar ii, showing angulation. Cæcum and beginning ascending colon: dilated. Pre-operative diagnosis: Hepato-duodenal membrane. Duodeno-jejunal angle obstruction. Pericolic membrane. Post-operative adhesion. Ovarian tumor.

Operation: 6-14-19. Incision: Vertical left rectus, below navel. Removal cystic tumor, left ovary, wound sutured. Incision: T. R. R. Three cm. above navel. Findings: Stomach: enlarged, pushed over to left. Duodenum: apex, fixed high and kinked. Hepato-duodenal membrane: from proximal gall-bladder and cystic duct to apex of duodenum. Duodeno-jejunal angle: definitely obstructed. Dependent duodenum: much dilated; 4.5 cm. in diameter. Broad adhesions to old appendix scar. Right edge of omentum crossing lower ascending colon, causing marked constriction. Pericolic membrane: across middle of ascending colon, causing constriction. Pancreas, gall-bladder, kidneys: normal. Pelvic organs: normal except for left cyst. Procedure: Mobilization duodenum downward 3 cm. Mobilization colon. Duodeno-jejunostomy. Separation of adhesions. Convalescence: Uneventful.

Result: Two years. Improved. Still has some pain and flatulence and slight constipation. Color and nutrition improved. Appetite good. General endurance not greatly improved. Improved, two years.

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## EPITHELIOMA OF THE GENITO-URINARY ORGANS\*

BY ALBERT C. BRODERS, M.D.

OF ROCHESTER, MINNESOTA

SECTION ON SURGICAL PATHOLOGY, OF MAYO CLINIC

MALIGNANT neoplasms of the genito-urinary organs that arise from protective epithelium vary from soft, frond-shaped papillary epitheliomas of the bladder and of the pelvis of the kidney to ulcerated and indurated keratinized epitheliomas of the vulva and of the penis.

The term cancer is used loosely, but it is very important to know the type of cancer in a given case. No one would think of putting the ordinary garter snake and the death-dealing cobra in the same class, but they are both snakes. No one would think of putting the basal-cell epithelioma and the highly malignant melanotic epithelioma in the same class, but they are both cancers. A neoplasm can accomplish only what its cells can accomplish; if its cells are active, it is active. A neoplasm may be of papillary form and of a low degree of malignancy, or it may be papillary and of a high degree of malignancy. It may be flat or ulcerated and of a high degree of malignancy, or it may be flat or ulcerated and of a low degree of malignancy.

In two previous articles on epithelioma I divided the lesions, from the standpoint of cellular activity, into four groups. In grading epitheliomas one must always take into consideration the normal epithelium of the organ from which the epithelioma has arisen. The epithelium of the bladder, while of the protective type, differs from that of the lip and skin in that it lacks a well-defined keratinized or horny layer. Irritation in the bladder from a stone will produce an area of keratinization or leucoplakia for protective purposes just as the constant handling of an ax or shovel will produce areas of excessive keratinization on the palms of the hands in the form of calluses. Keratinization is a physiologic and not a pathologic process; without this process we would not have hair, finger nails, and toe nails, and animals would not have hoofs and horns. The normal cervix has some keratinization, while a prolapsed uterus may have a rather marked keratinization of its cervix epidermis. The penis and labium have about the same amount of keratinization normally as the lip and skin.

Papillary epitheliomas of the bladder, microscopically, often resemble the normal folds of bladder epithelium. Often they are composed of slender cells which resemble those of the basal layer; they also contain polyhedral cells resembling those of the upper layer. The grading of epitheliomas of the bladder depends on the proportion of these cells in the neoplasm com-

\* Presented before the Section on Pathology and Physiology at the Seventy-second Annual Session of the American Medical Association, June, 1921.

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pared with the spherical cells and irregular cells with prominent nucleoli (undifferentiated cells). Papillary epitheliomas of the pelvis, of the kidney and ureter are similar in structure.

Epitheliomas of the cervix, vagina, labium, and penis can be graded on the basis of the proportion of keratinization and large flat squamous cells with small nuclei to the number of undifferentiated cells. Microscopically, some epitheliomas of the cervix and vagina resemble the basal-cell epitheliomas of the skin; however, they should not be considered in the same group because they are highly malignant, and behave very much like the same type of epitheliomas of the tonsil and nasopharynx.

*Grades of Epitheliomas.*—I shall use the same grading of epitheliomas in this series of cases that I used in my two previous papers on epithelioma; that is, if about three-fourths of the epitheliomas are differentiated epithelium and one-fourth undifferentiated, they are graded 1 (Figs. 1, 2, and 3); if the differentiated and undifferentiated epithelium are about equal they are graded 2 (Figs. 4, 5, and 6); if the undifferentiated epithelium forms about three-fourths and the differentiated about one-fourth of the growth they are graded 3 (Figs. 7, 8, and 9); and if there is no tendency to cell differentiation they are graded 4 (Figs. 10, 11, and 12). The number of mitotic figures and the number of cells with single, large, deeply staining nucleoli play an important part in the grading.

My primary object in presenting this paper is to furnish data that will have a practical bearing on prognosis. From this standpoint, the size and location of the epithelioma are extremely important. An epithelioma may be relatively small and of an average degree of malignancy, but its location may make its complete extirpation, with the regional lymph-nodes, almost impossible.

Exact dimensions of the lesion were obtained in most cases, but it was impossible to obtain them in all, especially if a cautery had been used; in these only approximate sizes were secured, which were divided, from the surgeon's description, into small, medium, and large. The lesions in which the exact dimensions were obtained were also divided into three groups. If the greatest diameter of the lesion was 2 cm. or less it was considered small; if it was from 2 cm. to 4 cm. it was considered medium, and if it was more than 4 cm. it was considered large. Thus, a combination of exact and approximate dimensions of practically all lesions were secured.

Metastasis was considered only when the lesion was in the labium or penis; it was not possible to obtain all the regional lymph-nodes in the other cases. Even in the cases of lesions in the labium or penis it was not possible to obtain all the regional lymph-nodes because some of the lymphatics from these organs drain into the pelvis. In cases of lesions of other organs, especially the cervix and vagina, often only a small portion of the growth was obtained for examination, the remainder having been treated with the actual or the Percy cautery. In cases of lesions of the bladder, lymph-nodes were obtained only occasionally.

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CONCLUSIONS

1. The 473 cases in this series represent 23.65 per cent. of 2000 cases of general epithelioma observed in the Mayo Clinic from November 1, 1904, to July 22, 1915.
2. Epithelioma of the genito-urinary organs occurred more often in females than in males; the proportion was about three to one.
3. The average age of all patients was 50.04 years. The average age of patients with lesions of the cervix was 47.25 years, of the bladder 53.51 years, of the labium 57.87 years, of the penis 54.1 years, of the vagina 46.72 years, and of the urethra 57.75 years.
4. Ninety-five and ninety-eight hundredths per cent. of all patients were married or had been married; 98.53 per cent. of the patients with lesions of the cervix were married or had been married; 93.53 per cent. of the patients with lesions of the labium were married or had been married; 93.08 per cent. of the patients with lesions of the penis were married or had been married; and 100 per cent. of the patients with lesions of the vagina were married or had been married.
5. Thirty-three and eighty-five hundredths per cent. of the men were farmers, in contrast to 56.7 per cent. of farmers among the patients with squamous-cell epithelioma of the lip, and 53.96 per cent. among patients with squamous-cell epithelioma of the skin.
6. Eleven and eighty-three hundredths per cent. of the patients had a family history of malignancy.
7. Eighty-nine and thirty-four hundredths per cent. of the patients with lesions of the cervix, 88.88 per cent. with lesions of the labium, and 94.10 per cent. with lesions of the vagina had been pregnant one or more times.
8. Forty-one and twenty-six hundredths per cent. of the patients with lesions of the cervix had passed the menopause.
9. Ninety-three and sixty-three hundredths per cent. of the patients with lesions of the cervix, 94.17 per cent. with lesions of the bladder, 88.88 per cent. with lesions of the vagina, and 75 per cent. with lesions of the urethra gave histories of hemorrhage.
10. The average duration of the lesion in the cervix was 0.79 year, in the bladder 2.60 years, in the labium 1.73 years, in the penis 1.44 years, in the vagina 0.69 year, and in the urethra 0.87 year.
11. The average duration of the lesion in all of the patients was 1.35 years.
12. Sixty-six and thirty-nine hundredths per cent. of the lesions of the cervix, 40.50 per cent. of the bladder, 18.18 per cent. of the labium, 22.73 per cent. of the penis, and 71.42 per cent. of the vagina were large.
13. Twenty-seven and twelve hundredths per cent. of the lesions of the cervix, 51.89 per cent. of the bladder, 50.09 per cent. of the labium, 54.54 per cent. of the penis, and 28.57 per cent. of the vagina were medium.

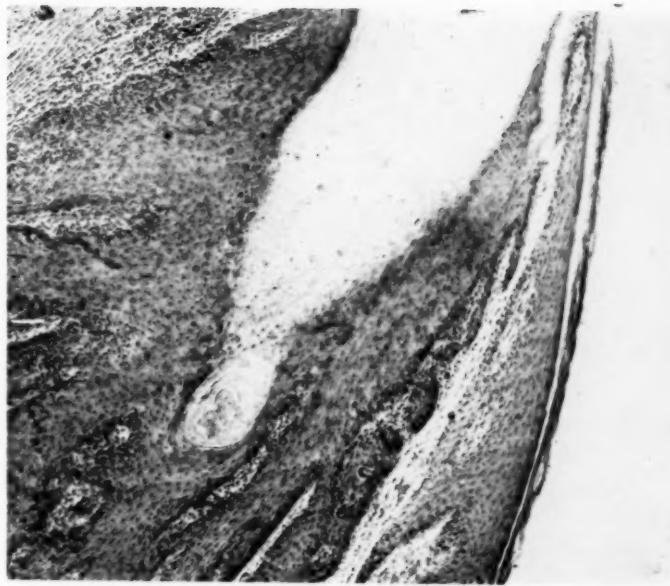


FIG. 1.—(A125824). Grade I epithelioma of the penis.



FIG. 2.—(A83994). Grade I epithelioma of the bladder.



FIG. 4.—(A72771). Grade 2 epithelioma of the cervix.

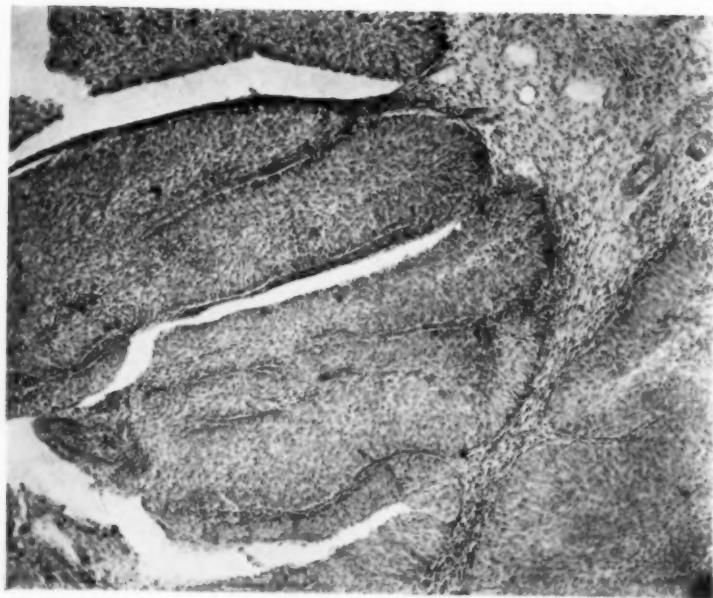


FIG. 3.—(A23702). Grade 1 epithelioma of the bladder.

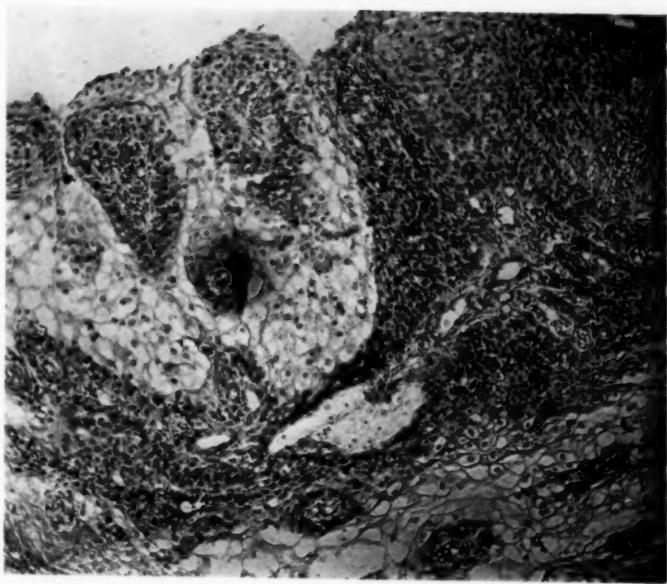


FIG. 5.—(A27862). Grade 2 epithelioma of the bladder.

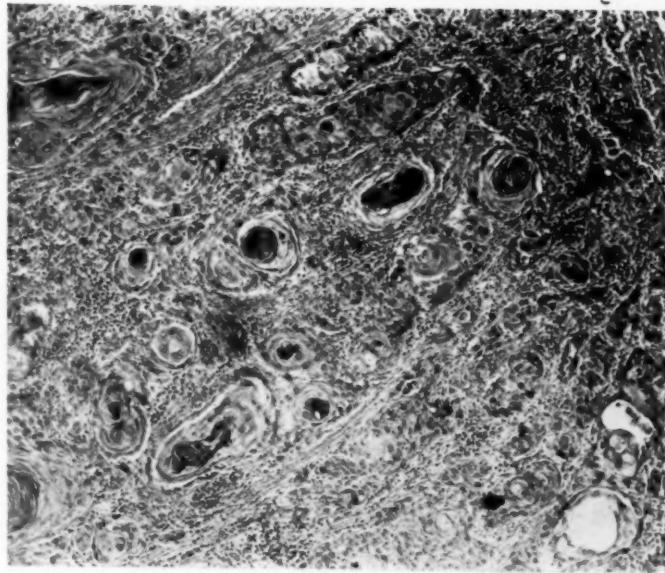


FIG. 6.—(A11509). Grade 2 epithelioma of the penis.

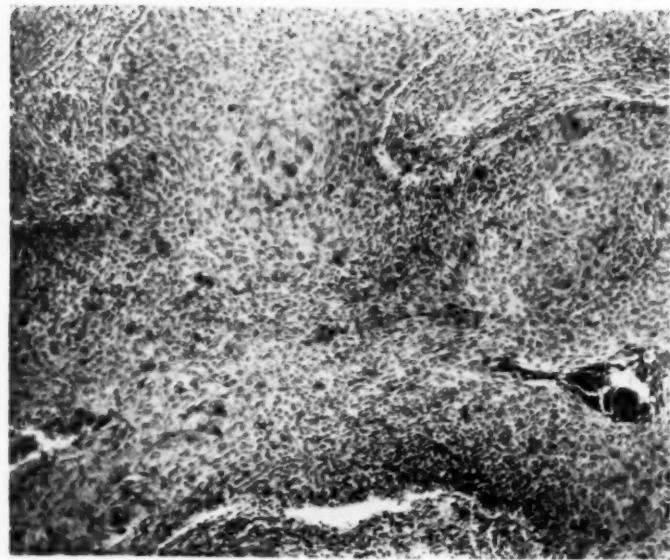


FIG. 8.—(A90468). Grade 3 epithelioma of the cervix.

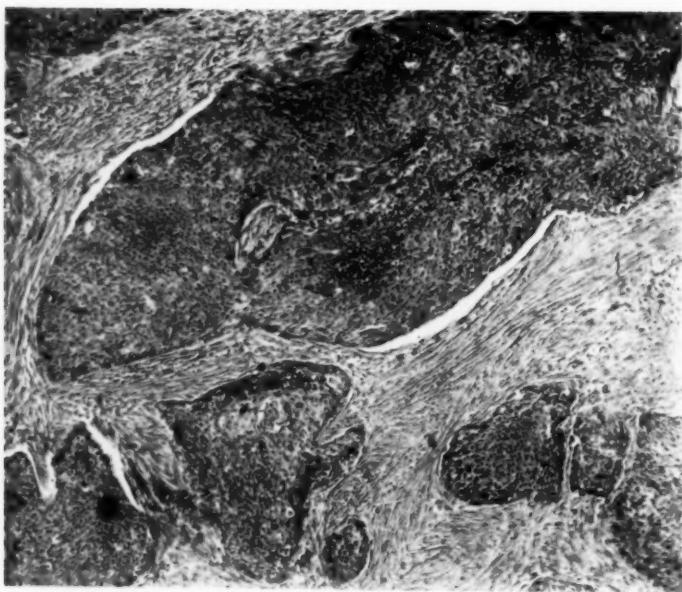


FIG. 7.—(A43608). Grade 3 epithelioma of the cervix.

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14. Six and forty-seven hundredths per cent. of the lesions of the cervix, 7.59 per cent. of the bladder, 22.73 per cent. of the labium, and 22.73 per cent. of the penis were small.

15. Fifty-six and eighty-seven hundredths per cent. of the epitheliomas of the genito-urinary organs were located in the cervix, 25.36 per cent. in the bladder, 6.55 per cent. on the labia, 6.13 per cent. on the penis, 3.80 per cent. in the vagina, 0.84 per cent. in the urethra, 0.21 per cent. in the pelvis of the kidney, and 0.21 per cent. in the ovary.

16. Ninety-three and two hundredths per cent. of all patients were operated on.

17. In 62.96 per cent. of the operable cases of lesions of the labium the inguinal lymph-nodes were removed; metastasis was demonstrated in 58.82 per cent.

18. In 78.57 per cent. of operable lesions of the penis the inguinal lymph-nodes were removed; metastasis was demonstrated in 18.18 per cent.

19. In a classification of the epitheliomas of all of the genito-urinary organs according to cellular activity, 5.07 per cent. were graded 1, 24.52 per cent. were graded 2, 43.55 per cent. were graded 3, and 26.84 per cent. were graded 4.

20. Seventy-six and fifty-nine hundredths per cent. of the patients operated on have been traced; 21.36 per cent. are living, 78.63 per cent. are dead.

21. Ninety-four and forty-four hundredths per cent. of the living patients report good results; they have lived on an average of 8.58 years since the last or only operation.

22. Excluding postoperative deaths and deaths in which the cause was not determined, 6.72 per cent. of the patients obtained good results and lived on an average of 6.34 years after the last or only operation.

23. Excluding postoperative deaths and deaths in which the cause was not determined, 93.27 per cent. of deaths were caused by epithelioma; these patients lived on an average of 1.34 years after the last or only operation.

24. Twenty and seventy-two hundredths per cent. of patients with lesions of the cervix, who had been pregnant, obtained good results, and 79.26 per cent. obtained poor results, contrasted with good results in 12.50 per cent. and poor results in 87.50 per cent. in those who had not been pregnant.

25. Ten and nine hundredths per cent. of the patients with large lesions of the cervix obtained good results, and 89.90 per cent. obtained poor results. Thirty-three and thirty-three hundredths per cent. of patients with medium lesions obtained good results, and 66.66 per cent. obtained poor results. One hundred per cent. of patients with small lesions obtained good results.

26. Thirty-three and thirty-three hundredths per cent. of patients with large lesions of the bladder obtained good results, and 66.66 per cent. obtained poor results. Forty-six and sixty-six hundredths per cent. of patients with

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medium lesions of the bladder obtained good results, and 53.33 per cent. poor results. Eighty per cent. of the patients with small lesions of the bladder obtained good results and 20 per cent. obtained poor results.

27. Nine and nine hundredths per cent. of the patients with medium lesions of the labium obtained good results, and 90.90 per cent. poor results. Twenty-five per cent. of the patients with small lesions obtained good results, 25 per cent. fair results, and 50 per cent. poor results.

28. One hundred per cent. of the patients with large lesions in the penis obtained poor results; 37.50 per cent. of the patients with medium lesions obtained good results, 12.50 per cent. fair results, and 50 per cent. poor results; 66.66 per cent. of the patients with small lesions obtained good results, and 33.33 per cent. poor results.

29. One hundred per cent. of the patients with large lesions in the vagina obtained poor results, and 100 per cent. of the patients with medium lesions obtained good results.

30. Fourteen and twenty-eight hundredths per cent. of the patients with metastasis who had lesions in the labium obtained good results, and 85.71 per cent. poor results; 20 per cent. of the patients without metastasis obtained good results, 20 per cent. fair results, and 60 per cent. poor results; 20 per cent. of the patients in whom no regional lymph-nodes were removed obtained good results, and 80 per cent. poor results.

31. One hundred per cent. of the patients with metastasis who had lesions in the penis obtained poor results, 63.63 per cent. of the patients without metastasis obtained good results, 9.09 per cent. fair results, 27.27 per cent. poor results, and 100 per cent. of the patients in whom no regional lymph-nodes were removed obtained poor results.

32. Seventeen and seventy-seven hundredths per cent. of the patients with lesions of the cervix are alive with good results, they have been free from the disease for an average of 9.32 years.

33. Two and twenty-two hundredths per cent. of the patients with lesions of the cervix obtained good results, and had been free from disease an average of 6.05 years at the time of death.

34. Twenty per cent., or one in five, patients with lesions of the cervix obtained good results.

35. Eighty per cent. of the patients with lesions of the cervix obtained poor results, and lived an average of 1.27 years.

36. Thirty-seven and fourteen hundredths per cent. of the patients with lesions of the bladder are alive with good results; they have been free from the disease for an average of 7.54 years.

37. Eleven and forty-two hundredths per cent. of the patients with lesions of the bladder obtained good results, and had been free from the disease an average of 6.26 years at the time of death.

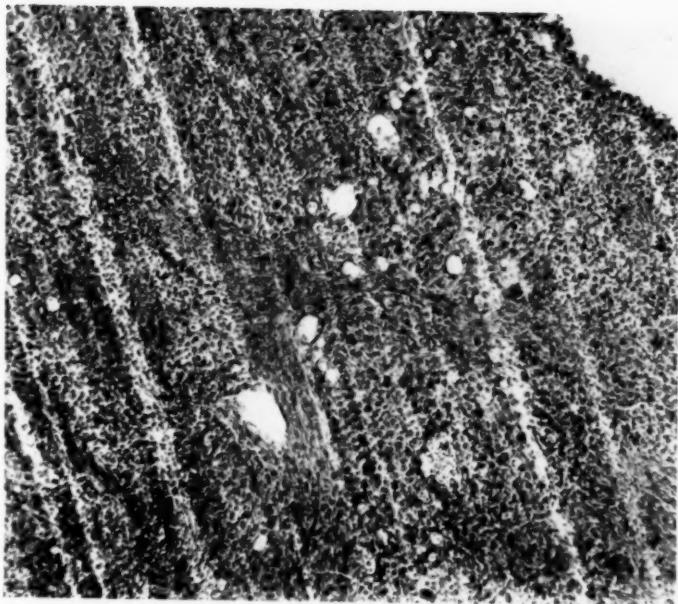


FIG. 9.—(A30633). Grade 3 epithelioma of the bladder.



FIG. 10.—(A89686). Grade 4 epithelioma of the cervix.

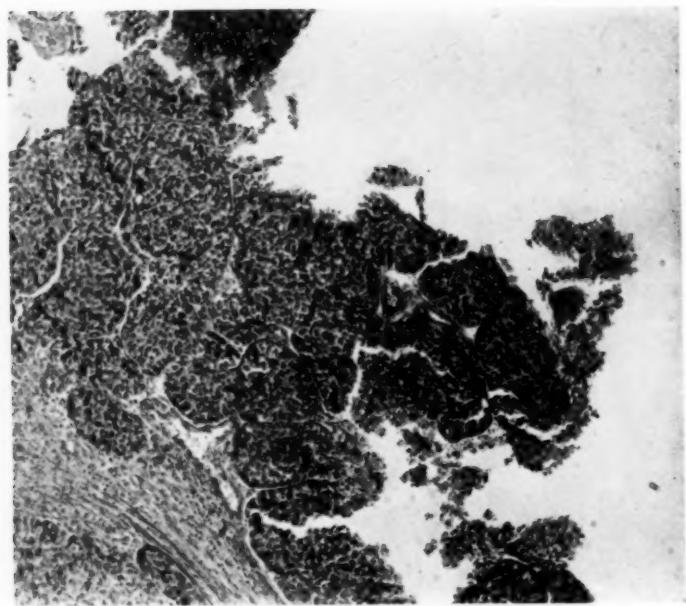


FIG. 12.—(A61803). Grade 4 epithelioma of the bladder.

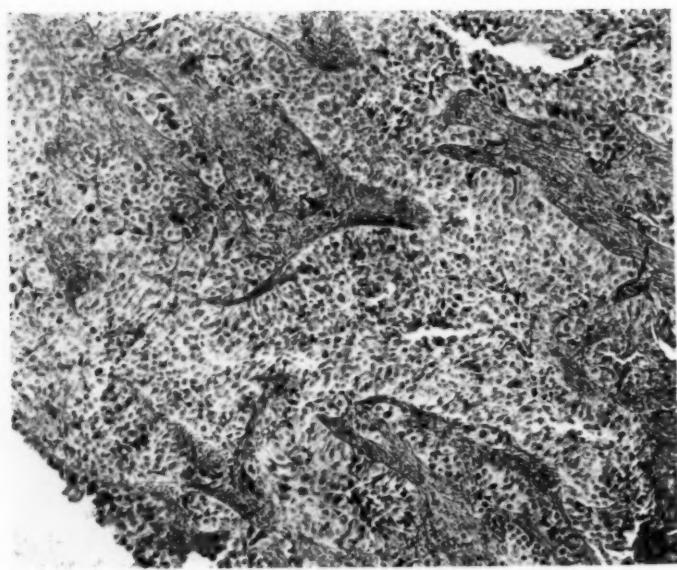


FIG. 11.—(A61721). Grade 4 epithelioma of the bladder.

## EPITHELIOMA OF THE GENITO-URINARY ORGANS

38. Forty-eight and fifty-six hundredths per cent., nearly one-half of the patients, with lesions of the bladder obtained good results.
39. Two and eighty-five hundredths per cent. of the patients with lesions of the bladder are alive with fair results.
40. Forty-eight and fifty-seven hundredths per cent. of the patients with lesions of the bladder obtained poor results; they lived for an average of 1.22 years.
41. Seventeen and sixty-four hundredths per cent. of the patients with lesions of the labium are alive with good results; they have been free from the disease for an average of 7.78 years.
42. Five and eighty-eight hundredths per cent. of the patients with lesions of the labium obtained fair results.
43. Seventy-six and forty-seven hundredths per cent. of the patients with lesions of the labium obtained poor results; they lived an average of 2.47 years.
44. Twenty-three and fifty-two hundredths per cent. of the patients with lesions of the penis are alive with good results; they have been free from the disease for an average of 10.42 years.
45. Seventeen and sixty-four hundredths per cent. of the patients with lesions of the penis who are dead obtained good results and had been free from the disease an average of 6.95 years.
46. Forty-one and sixteen hundredths per cent. of the patients with lesions of the penis obtained good results.
47. Five and eighty-eight hundredths per cent. of the patients with lesions of the penis obtained fair results.
48. Fifty-two and ninety-four hundredths per cent. of the patients with lesions of the penis who are dead obtained poor results; they lived for an average of 1.66 years.
49. Thirty-three and thirty-three hundredths per cent. of the patients with lesions of the vagina are alive with good results; they have been free from the disease for an average of 8.32 years.
50. Sixty-six and sixty-six hundredths per cent. of the patients with lesions of the vagina obtained poor results and lived for an average of 0.61 year.
51. In a consideration of all the organs from the standpoint of the grade of malignancy relative to mortality and exclusive of deaths from unknown causes and deaths post-operatively, epithelioma was the cause of death in 33.33 per cent. of patients in Grade 1, in 81.08 per cent. in Grade 2, in 96.33 per cent. in Grade 3, and 97.29 per cent. in Grade 4.
52. The total good results for all organs were 83.33 per cent. in Grade 1, 45.90 per cent. in Grade 2, 25.00 per cent. in Grade 3, and 12.19 per cent. in Grade 4.

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53. The total poor results for all organs were 8.33 per cent. in Grade 1, 49.18 per cent. in Grade 2, 75 per cent. in Grade 3, and 87.80 per cent. in Grade 4.

54. Twenty-three and five hundredths per cent. of all the patients are alive with good results; they have been free from the disease for an average of 8.58 years; 5.08 per cent. of the patients obtained good results and had been free from the disease for an average of 6.34 years at the time of death; 28.13 per cent. obtained good results; 1.35 per cent. are alive with fair results, and 70.50 per cent. obtained poor results and lived for an average of 1.34 years.

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## EPITHELIOMA OF THE GENITO-URINARY ORGANS

### EPITHELIOMA OF THE GENITO-URINARY ORGANS

*Four hundred seventy-three cases (23.65 per cent of 2000 cases of general epithelioma)  
from November 1, 1904, to July 22, 1915*

	Patients	Per cent.
Number . . . . .	473	
Females . . . . .	346	73.15
Males . . . . .	127	26.84
<i>Lesions of the bladder</i>		
Males . . . . .	96	80.0 of 120
Female . . . . .	24	20.0 of 120
<i>Lesions of the urethra</i>		
Females . . . . .	3	75.0 of 4
Males . . . . .	1	25.0 of 4
Family history of malignancy . . . . .	56	11.83 of 473
<i>Years</i>		
Youngest patient . . . . .	23	
Oldest patient . . . . .	86	
Average age of patients . . . . .	50.04	
<i>Lesions of the cervix</i>		
Youngest . . . . .	23	
Oldest . . . . .	69	
Average . . . . .	47.25	
<i>Lesions of the bladder</i>		
Youngest . . . . .	29	
Oldest . . . . .	78	
Average . . . . .	53.51	
<i>Lesions of the labium</i>		
Youngest . . . . .	27	
Oldest . . . . .	86	
Average . . . . .	57.87	
<i>Lesions of the penis</i>		
Youngest . . . . .	29	
Oldest . . . . .	80	
Average . . . . .	54.1	
<i>Lesions of the vagina</i>		
Youngest . . . . .	27	
Oldest . . . . .	65	
Average . . . . .	46.72	
<i>Lesions of the urethra</i>		
Youngest . . . . .	44	
Oldest . . . . .	69	
Average . . . . .	57.75	
<i>Lesions of the kidney</i>		
One patient . . . . .	47	
<i>Lesions of the ovary</i>		
One patient . . . . .	58	

### CIVIL STATE.

	Patients	Per cent.
Married . . . . .	387	81.81 of 473
Widowed . . . . .	60	12.68 of 473
Single . . . . .	19	4.01 of 473
Divorced . . . . .	6	1.27 of 473
Separated . . . . .	1	0.21 of 473

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EPITHELIOMA OF THE GENITO-URINARY ORGANS—Continued  
CIVIL STATE—Continued

	Patients	Per cent.
<i>Lesions of the cervix</i>		
Married . . . . .	222	82.52 of 269
Widowed . . . . .	38	14.12 of 269
Single . . . . .	4	1.48 of 269
Divorced . . . . .	4	1.48 of 269
Separated . . . . .	1	0.37 of 269
<i>Lesions of the labium</i>		
Married . . . . .	24	77.41 of 31
Widowed . . . . .	5	16.12 of 31
Single . . . . .	2	6.45 of 31
<i>Lesions of the penis</i>		
Married . . . . .	25	86.20 of 29
Single . . . . .	2	6.89 of 29
Divorced . . . . .	1	3.44 of 29
Widowed . . . . .	1	3.44 of 29
<i>Lesions of the vagina</i>		
Married . . . . .	16	88.88 of 18
Widowed . . . . .	2	11.11 of 18
<i>Occupation (males)</i>		
Farmer . . . . .	43	33.85 of 127
Merchant . . . . .	15	11.81 of 127
Manufacturer . . . . .	8	6.29 of 127
Railroad employee . . . . .	6	4.72 of 127
Traveling salesman . . . . .	6	4.72 of 127
Physician . . . . .	5	3.93 of 127
Other occupations, 35; each under 2 per cent . . . . .	44	34.64 of 127
<i>Location of the lesion</i>		
Cervix . . . . .	269	56.87 of 473
Bladder . . . . .	120	25.36 of 473
Labium . . . . .	31	6.55 of 473
Penis . . . . .	29	6.13 of 473
Vagina . . . . .	18	3.80 of 473
Urethra . . . . .	4	0.84 of 473
Kidney . . . . .	1	0.21 of 473
Ovary* . . . . .	1	0.21 of 473
<b>DURATION.†</b>		
	Years	
<i>Lesions of the cervix</i>		
Longest . . . . .	8	
Shortest . . . . .	0.08	
Average . . . . .	0.79	
<i>Lesions of the bladder</i>		
Longest . . . . .	20	
Shortest . . . . .	0.05	
Average . . . . .	2.60	
<i>Lesions of the labium</i>		
Longest . . . . .	20	
Shortest . . . . .	0.12	
Average . . . . .	1.73	
<i>Lesions of the penis</i>		
Longest . . . . .	5	
Shortest . . . . .	0.29	
Average . . . . .	1.44	

\*Epithelioma was primary in a dermoid cyst.

†The duration of the lesions in most of the internal organs is based, for the most part, on the appearance of hemorrhage.

## EPITHELIOMA OF THE GENITO-URINARY ORGANS

### EPITHELIOMA OF THE GENITO-URINARY ORGANS—Continued DURATION—Continued

	Years
<i>Lesions of the vagina</i>	
Longest.....	2
Shortest.....	0.15
Average.....	0.69
<i>Lesions of the urethra</i>	
Longest.....	1.25
Shortest.....	0.25
Average.....	0.87
<i>Lesions of the kidney</i>	
One case.....	2
<i>Lesions of the ovary</i>	
One case.....	1.33
<i>Lesions of all organs</i>	
Longest.....	20
Shortest.....	0.05
Average.....	1.35

	SIZE	Patients	Per cent.
<i>Lesions of the cervix</i>			
Large (over 4 cm.).....	164	66.39 of 247	
Medium (between 2 cm. and 4 cm.).....	67	27.12 of 247	
Small (under 2 cm.).....	16	6.47 of 247	
Not stated.....	9		
<i>Lesions of the bladder</i>			
Large (over 4 cm.).....	32	40.50 of 79	
Medium (between 2 cm. and 4 cm.).....	41	51.89 of 79	
Small (under 2 cm.).....	6	7.59 of 79	
Single.....	79	84.04 of 94	
Multiple.....	15	15.95 of 94	
Not stated.....	15		
<i>Lesions of the labium</i>			
Large (over 4 cm.).....	4	18.18 of 22	
Medium (between 2 cm. and 4 cm.).....	13	59.09 of 22	
Small (under 2 cm.).....	5	22.73 of 22	
Not stated.....	5		
<i>Lesions of the penis</i>			
Large (over 4 cm.).....	5	22.73 of 22	
Medium (between 2 cm. and 4 cm.).....	12	54.54 of 22	
Small (under 2 cm.).....	5	22.73 of 22	
Not stated.....	5		
<i>Lesions of the vagina</i>			
Large (over 4 cm.).....	10	71.42 of 14	
Medium (between 2 cm. and 4 cm.).....	4	28.57 of 14	
<i>Lesions of the urethra</i>			
Large (over 4 cm.).....	1		
Not stated.....	3		
<i>Lesions of the kidney</i>			
Large (over 4 cm.).....	1		
<i>Lesions of the ovary</i>			
Large (over 4 cm.).....	1		

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EPITHELIOMA OF THE GENITO-URINARY ORGANS—Continued  
PREGNANCIES

	Patients	Per cent.
<i>Lesions of the cervix</i>		
One or more children . . . . .	163	60.59 of 269
One or more children and one or more miscarriages . . . . .	65	24.16 of 269
One or more children, miscarriages, and stillbirths . . . . .	5	1.85 of 269
One or more miscarriages . . . . .	5	1.85 of 269
One or more miscarriages and premature births . . . . .	1	0.37 of 269
One or more children and stillbirths . . . . .	1	0.37 of 269
Married but never pregnant . . . . .	25	9.29 of 269
Single . . . . .	4	1.48 of 269
Patients passed the menopause . . . . .	111	41.26 of 269
<i>Lesions of the labium</i>		
One or more children . . . . .	21	77.77 of 27
One or more children and one or more miscarriages . . . . .	3	11.11 of 27
Married but never pregnant . . . . .	1	3.70 of 27
Single . . . . .	2	7.40 of 27
Not stated . . . . .	4	
<i>Lesions of the vagina</i>		
One or more children . . . . .	12	70.58 of 17
One or more children and one or more miscarriages . . . . .	3	17.64 of 17
One or more miscarriages . . . . .	1	5.88 of 17
Married but never pregnant . . . . .	1	5.88 of 17
Not stated . . . . .	1	
<b>HEMORRHAGE</b>		
	Patients	Per cent.
<i>Lesions of the cervix</i>		
Hemorrhage . . . . .	250	93.63 of 267
No hemorrhage . . . . .	17	6.36 of 267
Not stated . . . . .	2	
<i>Lesions of the bladder</i>		
Hemorrhage . . . . .	113	94.17 of 120
No hemorrhage . . . . .	7	5.83 of 120
<i>Lesions of the vagina</i>		
Hemorrhage . . . . .	16	88.88 of 18
No hemorrhage . . . . .	2	11.11 of 18
<i>Lesions of the urethra</i>		
Hemorrhage . . . . .	3	75.00 of 4
No hemorrhage . . . . .	1	25.00 of 4
<i>Lesions of the kidney</i>		
Hemorrhage . . . . .	1	
<b>OPERATIONS</b>		
	Patients	Per cent.
<i>Lesions of the cervix</i>		
Number . . . . .	256	95.16 of 269
Hysterectomy, vaginal or abdominal . . . . .	131	51.17 of 256
Actual cautery, with or without curettage . . . . .	28	10.93 of 256
Percy cautery, with or without opening abdomen . . . . .	26	10.15 of 256
Percy cautery followed later by hysterectomy . . . . .	14	5.46 of 256
One or more actual cauteries followed later by hysterectomy . . . . .	10	3.90 of 256
Two or more actual cauteries . . . . .	9	3.51 of 256
Hysterectomy followed later by one or more actual cauteries . . . . .	8	3.12 of 256
Two or more Percy cauteries . . . . .	4	1.56 of 256
Percy cautery (one operation) followed later by one or more actual cauteries . . . . .	3	1.17 of 256

## EPITHELIOMA OF THE GENITO-URINARY ORGANS

### EPITHELIOMA OF THE GENITO-URINARY ORGANS—Continued OPERATIONS—Continued

	Patients	Per cent.
<i>Lesions of the cervix—Continued</i>		
Miscellaneous (various combinations of operations).....	23	8.98 of 256
Number on whom hysterectomies were performed .....	178	69.53 of 256
Number on whom the actual cautery was used (one or more operations).....	76	29.68 of 256
Number on whom the Percy cautery was used (one or more operations).....	51	19.92 of 256
In inoperable condition .....	12	4.46 of 269
Refused operation.....	1	0.37 of 269
<i>Lesions of the bladder</i>		
Number.....	109	90.83 of 120
Suprapubic cystotomy, excision of the epithelioma with knife immediately followed by actual cautery.....	21	19.26 of 109
Suprapubic cystotomy, excision of the epithelioma with actual cautery.....	18	16.51 of 109
Suprapubic cystotomy and excision of the epithelioma with knife.....	7	6.42 of 109
Suprapubic cystotomy and actual cautery .....	4	3.66 of 109
Suprapubic cystotomy, excision of the epithelioma with Percy cautery .....	3	2.75 of 109
Miscellaneous (various combinations of operations such as transperitoneal and suprapubic resections of part or all of the bladder, with or without transplantation of one or both ureters, excisions with knife, actual cautery, Percy cautery, fulgurations, and so forth).....	56	51.37 of 109
Number in whom the actual cautery was used one or more times .....	72	66.05 of 109
Number in whom the Percy cautery was used one or more times .....	7	6.42 of 109
Number in whom from one-fourth to two-thirds of the bladder was resected .....	26	23.85 of 109
Number in whom the bladder was completely extirpated.....	2	1.83 of 109
Number in whom one or both ureters were transplanted.....	13	11.92 of 109
In inoperable condition .....	11	9.16 of 120
<i>Lesions of the labium</i>		
Number.....	27	87.09 of 31
Excision with knife.....	5	18.51 of 27
Excision with knife immediately followed by cautery .....	2	7.40 of 27
Excision with cautery .....	2	7.40 of 27
Amputation of one labium and excision of the inguinal lymph-nodes on the same side .....	2	7.40 of 27
Excision with cautery and excision of the inguinal lymph-nodes on the same side .....	2	7.40 of 27
Miscellaneous (various combinations of operations, such as one or more excisions with the knife, immediately followed by cautery, one or more excisions, with cautery and one or more cauteries, such operations with or without removal of the inguinal lymph-nodes on one or both sides at the same or different operations). Number in whom the inguinal lymph-nodes on one or both sides were removed at the same time or different times.....	14	51.85 of 27
Number in whom the inguinal lymph-nodes on one or both sides were removed at the same time or different times.....	17	62.96 of 27
In inoperable condition .....	4	12.90 of 31
<i>Lesions of the penis</i>		
Number.....	28	96.55 of 29
Amputation with knife and excision of inguinal lymph-nodes on both sides .....	13	46.42 of 28
Amputation with knife .....	2	7.14 of 28
Miscellaneous (various combinations of operations, such as amputation, partial amputation, reamputation with knife or Percy cautery, one or more actual cauteries, excisions with actual cautery or knife, with or without removal of the inguinal lymph-nodes on one or both sides at the same or different operations). Number in whom the inguinal lymph-nodes on both sides were removed .....	13	46.42 of 28
Number in whom the inguinal lymph-nodes on both sides were removed .....	19	67.85 of 28

## ALBERT C. BRODERS

EPITHELIOMA OF THE GENITO-URINARY ORGANS—Continued  
OPERATIONS—Continued

	Patients	Per cent.
<i>Lesions of the penis—Continued</i>		
Number in whom the inguinal lymph-nodes on one side were removed (the other side having been removed elsewhere).....	3	10.71 of 28
Number in whom the inguinal lymph-nodes on one or both sides were removed.....	22	78.57 of 28
In inoperable condition .....	1	3.44 of 29
<i>Lesions of the vagina</i>		
Number.....	14	77.77 of 18
Excision with knife.....	4	28.57 of 14
Percy cautery.....	3	21.42 of 14
Actual cautery.....	2	14.28 of 14
Hysterectomy with removal of vagina and vulva.....	1	7.14 of 14
Hysterectomy with removal of most of the vagina.....	1	7.14 of 14
Excision of entire posterior wall, anterior wall of rectum and part of bladder.....	1	7.14 of 14
Excision with actual cautery.....	1	7.14 of 14
Excision with knife.....	1	7.14 of 14
In inoperable condition .....	4	22.22 of 18
<i>Lesions of the urethra</i>		
Number.....	4	100 of 4
Four actual cauteries and one excision with the actual cautery.....	1	25.0 of 4
One actual cautery followed immediately by excision with knife.....	1	25.0 of 4
Removal of urethra and anterior third of the bladder followed in two years by one excision with knife, immediately followed by actual cautery .....	1	25.0 of 4
Suprapubic prostatectomy .....	1	25.0 of 4
<i>Lesions of the kidney</i>		
Number.....	1	
Nephrectomy.....	1	
<i>Lesions of the ovary</i>		
Number.....	1	
Resection of the entire sigmoid (the ovary had been removed elsewhere) .....	1	
FOUR HUNDRED SEVENTY-THREE EPITHELIOMAS, GRADED ON A BASIS OF 1 TO 4 ACCORDING TO CELLULAR ACTIVITY		
	Patients	Per cent.
Grade 1.....	24	5.07 of 473
Grade 2.....	116	24.52 of 473
Grade 3.....	206	43.55 of 473
Grade 4.....	127	26.84 of 473
<i>Lesions of the cervix</i>		
Grade 2.....	23	8.54 of 269
Grade 3.....	153	56.87 of 269
Grade 4.....	93	34.57 of 269
<i>Lesions of the bladder</i>		
Grade 1.....	21	17.50 of 120
Grade 2.....	44	36.66 of 120
Grade 3.....	32	26.66 of 120
Grade 4.....	23	19.16 of 120
<i>Lesions of the labium</i>		
Grade 2.....	25	80.64 of 31
Grade 3.....	5	16.12 of 31
Grade 4.....	1	3.22 of 31

## EPITHELIOMA OF THE GENITO-URINARY ORGANS

### EPITHELIOMA OF THE GENITO-URINARY ORGANS—Continued

FOUR HUNDRED SEVENTY-THREE EPITHELIOMAS GRADED ON A BASIS OF 1 TO 4  
ACCORDING TO CELLULAR ACTIVITY—Continued

	Patients	Per cent.
<i>Lesions of the penis</i>		
Grade 1	3	10.34 of 29
Grade 2	20	68.96 of 29
Grade 3	6	20.69 of 29
<i>Lesions of the vagina</i>		
Grade 2	1	5.55 of 18
Grade 3	8	44.44 of 18
Grade 4	9	50.00 of 18
<i>Lesions of the urethra</i>		
Grade 2	2	50.00 of 4
Grade 3	2	50.00 of 4
<i>Lesions of the kidney</i>		
Grade 2	1	
<i>Lesions of the ovary</i>		
Grade 4	1	

### GENERAL ULTIMATE RESULTS (ALL ORGANS)

Duration of life since last or only operation

Patients concerning whom information was received	337 (76.59 % of 440)
Patients living	
Good result	
Longest duration	16.15 years
Shortest duration	2.72 years
Average duration	8.58 years
Fair result	4 ( 5.55 % of 72)
Longest duration	8.8 years
Shortest duration	4.25 years
Average duration	6.86 years
Patients dead	
Good result	
Longest duration	11.54 years
Shortest duration	1.93 years
Average duration	6.34 years
Poor result	208 (93.27 % of 223)
Longest duration	8.83 years
Shortest duration	0.08 year
Average duration	1.34 years

### Cause of death of patients who recovered from epithelioma

(Data from relative or home physician)

	Patients	Per cent.
Known cause	14	93.33 of 15
Cancer of the stomach	2	14.28 of 14
Nephritis	2	14.28 of 14
Tuberculosis	2	14.28 of 14
Cancer of the face and jaw	1	7.14 of 14
Heart disease	1	7.14 of 14
Old age	1	7.14 of 14
Paralysis	1	7.14 of 14
Perforating ulcer of the stomach	1	7.14 of 14
Pneumonia	1	7.14 of 14
Strangulated hernia	1	7.14 of 14
Violence	1	7.14 of 14
Unknown	1	6.66 of 15

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EPITHELIOMA OF THE GENITO-URINARY ORGANS—Continued  
GENERAL ULTIMATE RESULTS (ALL ORGANS)—Continued

## Cause of death of patients who died in the Clinic following operation

	Patients	Per cent.
Kidney disease	8	
Heart disease	4	
Pneumonia	1	
Miscellaneous (various types of infection associated with or not associated with kidney or heart disease)	10	
	23	5.22 of 440

Cause of death of all patients operated on  
(Data from home physician, relative, or pathologic records of the Clinic)

	Patients	Per cent.
Known cause	253	95.47 of 265
Epithelioma	208	82.21 of 253
Kidney disease	10	3.95 of 253
Heart disease	6	2.37 of 253
Pneumonia	3	1.18 of 253
Violence	3	1.18 of 253
Cancer of the stomach	2	0.79 of 253
Operation elsewhere	2	0.79 of 253
Tuberculosis	2	0.79 of 253
Cancer of the face and jaw	1	0.39 of 253
Old age	1	0.39 of 253
Paralysis	1	0.39 of 253
Strangulated hernia	1	0.39 of 253
Ulcer of the intestine	1	0.39 of 253
Ulcer of the stomach	1	0.39 of 253
Miscellaneous (various types of infection associated with or not associated with kidney or heart disease)	11	4.34 of 253
Unknown	12	4.52 of 265
Longest duration	11.54 years	
Shortest duration	0.002 year	
Average duration	1.54 years	
Patients with inoperable epitheliomas	32	6.76 of 473
Patients with inoperable epitheliomas concerning whom information has been received (all dead)	19	59.37 of 32
Patient refused operation after diagnosis had been made (dead)	1	0.002 of 473

## Pregnancy in relation to lesions of the cervix in which the result is known

Patients having been pregnant	164 (91.11 % of 180)
Good result	34 (20.72 % of 164)
Poor result	130 (79.26 % of 164)
Patients not having been pregnant	16 (8.88 % of 180)
Good result	2 (12.50 % of 16)
Poor result	14 (87.50 % of 16)

## Data relative to size obtainable in 166 cases of lesions of the cervix

	Small	Medium	Large
Number	3 (1. 8% of 166)	54 (32.53% of 166)	109 (65.66% of 166)
Grade 2	1 (33.33% of 3)	8 (14.81% of 54)	6 (5.50% of 109)
Grade 3	1 (33.33% of 3)	30 (55.55% of 54)	65 (59.63% of 109)
Grade 4	1 (33.33% of 3)	16 (29.62% of 54)	38 (34.86% of 109)
Average duration of lesion (patients living and dead).	0.25 year	0.86 year	0.74 year

## EPITHELIOMA OF THE GENITO-URINARY ORGANS

### EPITHELIOMA OF THE GENITO-URINARY ORGANS—Continued GENERAL ULTIMATE RESULTS (ALL ORGANS)—Continued

*Data relative to size obtainable in 166 cases of lesions of the cervix—Continued*

	Small	Medium	Large
Patients living .....	3 (100 % of 3)	17 (31.48 % of 54)	9 (8.25 % of 109)
Good result .....	3 (100 % of 3)	17 (100 % of 17)	9 (100 % of 9)
Average duration of lesion ..	0.25 year	1.11 years	0.90 year
Average duration of life since last or only operation ..	6.26 years	8.84 years	7.8 years
Patients dead .....		37 (68.51 % of 54)	100 (91.74 % of 109)
Good result .....		1 (2.70 % of 37)	2 (2.00 % of 100)
Average duration of lesion ..		0.33 year	0.87 year
Average duration of life since last or only operation ..		3.33 years	7.08 years
Poor result .....		36 (97.29 % of 37)	98 (98.00 % of 100)
Average duration of lesion ..		0.77 year	0.73 year
Average duration of life since last or only operation ..		1.64 years	1.41 years
Average duration of life since last or only operation (patients living and dead) ..		3.93 years	1.93 years
Total good result* .....	100 % of 3	33.33 % of 54	10.09 % of 109
Total poor result** .....		66.66 % of 54	89.90 % of 109

\* Patient recovered from epithelioma and is living, or recovered from epithelioma and died from other cause.

\*\* Patient died from epithelioma.

*Data relative to size obtainable in fifty-six cases of lesions of the bladder*

	Small	Medium	Large
Number .....	5 (8.92 % of 56)	30 (53.57 % of 56)	21 (37.50 % of 56)
Grade 1 .....	3 (60.00 % of 5)	3 (10.00 % of 30)	3 (14.28 % of 21)
Grade 2 .....	1 (20.00 % of 5)	8 (26.66 % of 30)	2 (9.52 % of 21)
Grade 3 .....	1 (20.00 % of 5)	13 (43.33 % of 30)	8 (38.09 % of 21)
Grade 4 .....	1 (20.00 % of 5)	6 (20.00 % of 30)	8 (38.09 % of 21)
Average duration of lesion (patients living and dead) ..	1.37 years	1.67 years	2.35 years
Patients living .....	3 (60.00 % of 5)	12 (40.00 % of 30)	5 (23.80 % of 21)
Good result .....	3 (100 % of 3)	12 (100 % of 12)	5 (100 % of 5)
Average duration of lesion ..	1.79 years	1.23 years	2.75 years
Average duration of life since last or only operation ..	7.83 years	7.09 years	9.24 years
Patients dead .....	2 (40.00 % of 5)	18 (60.00 % of 30)	16 (76.19 % of 21)
Good result .....	1 (50.00 % of 2)	2 (11.11 % of 18)	2 (12.50 % of 16)
Average duration of lesion ..	0.41 year	2 years	0.75 year
Average duration of life since last or only operation ..	6.58 years	7.38 years	7.63 years
Poor result .....	1 (50.00 % of 2)	16 (88.88 % of 18)	14 (87.50 % of 16)
Average duration of lesion ..	1.08 years	1.96 years	2.44 years
Average duration of life since last or only operation ..	2.86 years	1.04 years	1.46 years
Average duration of life since last or only operation (patients living and dead) ..	6.59 years	3.88 years	3.9 years
Total good result .....	(80.00 % of 5)	(46.66 % of 30)	(33.33 % of 21)
Total poor result .....	(20.00 % of 5)	(53.33 % of 30)	(66.66 % of 21)

## ALBERT C. BRODERS

EPITHELIOMA OF THE GENITO-URINARY ORGANS—Continued  
GENERAL ULTIMATE RESULTS (ALL ORGANS)—Continued

## Data relative to size obtainable in fifteen cases of lesions of the labium

	Small	Medium
Number.....	4 (26.66 % of 15)	11 (73.33 % of 15)
Grade 2.....	2 (50.00 % of 4)	9 (81.81 % of 11)
Grade 3.....	2 (50.00 % of 4)	2 (18.18 % of 11)
Average duration of lesion (patients living and dead) .....	0.44 year	1.04 years
Patients living .....	2 (50.00 % of 4)	2 (18.18 % of 11)
Fair result .....	1 (50.00 % of 2)	
Average duration of lesion .....	1 year	
Average duration of life since last or only operation .....	4.25 years	
Good result .....	1 (50.00 % of 2)	2 (100 % of 2)
Average duration of lesion .....	0.5 year	2.12 years
Average duration of life since last or only operation .....	5.68 years	9.66 years
Patients dead.....	2 (50.00 % of 4)	9 (81.81 % of 11)
Poor result .....	2 (100 % of 2)	9 (100 % of 9)
Average duration of lesion .....	0.14 year	0.8 year
Average duration of life since last or only operation .....	1.35 years	3.13 years
Average duration of life since last or only operation (patients living and dead) .....	3.16 years	4.31 years
Total good result .....	(25.00 % of 4)	18.18 % of 11)
Total fair result* .....	(25.00 % of 4)	
Total poor result .....	(50.00 % of 4)	81.81 % of 11)

\* Patient living, with slight recurrence.

## Data relative to size obtainable in thirteen cases of lesions of the penis

	Small	Medium	Large
Number .....	3 (23.07 % of 13)	8 (61.53 % of 13)	2 (15.38 % of 13)
Grade 2 .....	2 (66.66 % of 3)	7 (87.50 % of 8)	1 (50.00 % of 2)
Grade 3 .....	1 (33.33 % of 3)	1 (12.50 % of 8)	1 (50.00 % of 2)
Average duration of lesion (patients living and dead) .....	0.77 year	1.22 years	2.08 years
Patients living .....	1 (33.33 % of 3)	2 (25.00 % of 8)	
Fair result .....		1 (50.00 % of 2)	
Average duration of lesion .....		0.5 year	
Average duration of life since last or only operation .....		8.75 years	
Good result .....	1.50 years	1 (50.00 % of 2)	
Average duration of lesion .....		1 year	
Average duration of life since last or only operation .....	10.66 years	11.52 years	
Patients dead .....	2 (66.66 % of 3)	6 (75.00 % of 8)	
Good result .....	1 (50.00 % of 2)	2 (33.33 % of 6)	2 (100 % of 2)
Average duration of lesion .....	0.33 year	1.5 years	
Average duration of life since last or only operation .....	10.05 years	10.41 years	

## EPITHELIOMA OF THE GENITO-URINARY ORGANS

### EPITHELIOMA OF THE GENITO-URINARY ORGANS—Continued GENERAL ULTIMATE RESULTS (ALL ORGANS)—Continued

*Data relative to size obtainable in thirteen cases of lesions of the penis—Continued*

	Small	Medium	Large
Poor result .....	1 (50.00% of 2)	4 (66.66% of 6)	2 (100 % of 2)
Average duration of lesion	0.5 year	1.32 years	2.08 years
Average duration of life since last or only operation	0.41 year	1.2 years	2.88 years
Average duration of life since last or only operation (patients living and dead)...	7.04 years	5.74 years	2.88 years
Total good result .....	66.66% of 3	37.50% of 8	
Total fair result .....		12.50% of 8	
Total poor result .....	33.33% of 3	50.00% of 8	100%

*Data relative to size obtainable in six cases of lesions of the vagina*

	Medium	Large
Number .....	2 (33.33% of 6)	4 (66.66% of 6)
Grade 3.....	1 (50.00% of 2)	2 (50.00% of 4)
Grade 4.....	1 (50.00% of 2)	2 (50.00% of 4)
Average duration of lesion (patients living and dead).....	1.62 years	0.62 year
Patients living.....	2 (100 % of 2)	
Good result .....	2 (100 % of 2)	
Average duration of lesion .....	1.62 years	
Average duration of life since last or only operation .....	8.32 years	
Patients dead.....		4 (100 % of 4)
Poor result.....		4 (100 % of 4)
Average duration of lesion .....		0.62 year
Average duration of life since last or only operation .....		0.61 year
Average duration of life since last or only operation (patients living and dead).....	8.32 years	0.61 year
Total good result .....	100% of 2	
Total poor result.....		100 % of 4

### *Lesions of the labium*

*Patients with metastasis operated on with removal of inguinal lymph-nodes*

Patients concerning whom information was not received .....	3 (30.00% of 10)
Patients concerning whom information was received .....	7 (70.00% of 10)
Grade 2 .....	Grade 3 .....
Patients living.....	1 (14.28% of 7)
Good result .....	1 (100 % of 1)
Patients dead .....	6 (85.71% of 7)
Poor result .....	5 (83.33% of 6) 1 (16.16% of 6)
Total good result .....	1 (14.28% of 7)
Total poor result.....	6 (85.71% of 7)
Epithelioma.....	Cause of Death
	6 (100 % of 6)

## ALBERT C. BRODERS

EPITHELIOMA OF THE GENITO-URINARY ORGANS—Continued  
GENERAL ULTIMATE RESULTS (ALL ORGANS)—Continued

## Lesions of the labium—Continued

Patients without metastasis operated on with removal of inguinal lymph-nodes

Patients concerning whom information was not received.....	1 (14.28% of 7)
Patients concerning whom information was received.....	6 (85.71% of 7)
Grade 2	Grade 3
Patients living.....	2 (33.33% of 6)
Good result.....	1 (100 % of 1)
Fair result.....	1 (100 % of 1)
Patients dead.....	4 (66.66% of 6)
Poor result.....	2 (66.66% of 3) 1 (33.33% of 3)
Cause unknown.....	1
Total good result.....	1 (20.00% of 5)
Total fair result.....	1 (20.00% of 5)
Total poor result.....	3 (60.00% of 5)
Cause of death	
Epithelioma.....	3 (100 % of 3)

Patients operated on without removal of inguinal lymph-nodes

Patients concerning whom information was not received.....	4 (36.36% of 11)
Patients concerning whom information was received.....	7 (63.63% of 11)
Grade 2	Grade 3
Patients living.....	1 (14.28% of 7)
Good result.....	1 (100 % of 1)
Patients dead.....	6 (85.71% of 7)
Poor result.....	2 (50.00% of 4) 2 (50.00% of 4)
Postoperative death.....	1
Cause unknown.....	1
Total good result.....	1 (20.00% of 5)
Total poor result.....	4 (80.00% of 5)
Cause of death	
Epithelioma.....	4 (80.00% of 5)
Cellulitis of the vulva and thigh.....	1 (20.00% of 5)

Patients with metastasis and patients without metastasis operated on with removal of inguinal lymph-nodes and patients operated on without removal of inguinal lymph-nodes

	Grade 2	Grade 3
Patients with metastasis .....	9 (90.00% of 10)	1 (10.00% of 10)
Patients without metastasis .....	5 (71.42% of 7)	2 (28.57% of 7)
Patients without removal of inguinal lymph-nodes at operation .....	9 (81.81% of 11)	2 (18.18% of 11)

Duration of lesion at the time of patient's examination at the Clinic

	Longest	Shortest	Average
Patients with metastasis .....	2 years	1.66 years	0.99 year
Patients without metastasis .....	5 years	0.33 year	1.51 years
Patients without removal of inguinal lymph-nodes .....	4 years	0.12 year	1.3 years

Size of lesion at the time of patient's examination at the Clinic

	Small	Medium	Large
Patients with metastasis .....	2 (33.33% of 6)	3 (50.00% of 6)	1 (16.66% of 6)
Patients without metastasis .....	2 (33.33% of 6)	4 (66.66% of 6)	
Patients without removal of inguinal lymph-nodes .....	3 (27.27% of 11)	7 (63.63% of 11)	1 ( 9.09% of 11)
Not stated .....	5		

## EPITHELIOMA OF THE GENITO-URINARY ORGANS

### EPITHELIOMA OF THE GENITO-URINARY ORGANS—Continued GENERAL ULTIMATE RESULTS (ALL ORGANS)—Continued

#### *Lesions of the labium—Continued*

##### Duration of life after operation of patients with metastasis

Patients concerning whom information was not received . . . . .	Grade 2	Grade 3	3 (30.00% of 10) 7 (70.00% of 10)
Patients concerning whom information was received . . . . .			
Patients living . . . . .			1 (14.28% of 7)
Good result . . . . .	1 (100 % of 1)		9.32 years
Patients dead . . . . .			6 (85.71% of 7)
Poor result . . . . .	5 (83.33% of 6)	1 (16.66% of 6)	All grades
Longest duration . . . . .	3.7 years	0.16 year	3.7 years
Shortest duration . . . . .	0.5 year		0.5 year
Average duration . . . . .	1.26 years		1.07 years

##### Duration of life after operation of patients without metastasis

Patients concerning whom information was not received . . . . .	Grade 2	Grade 3	1 (14.28% of 7) 6 (85.71% of 7)
Patients concerning whom information was received . . . . .			
Patients living . . . . .			2 (33.33% of 6)
Good result . . . . .	1 (100 % of 1)		5.68 years
Fair result . . . . .	1 (100 % of 1)		4.25 years
Patients dead . . . . .			4 (66.66% of 6)
Poor result . . . . .	2 (66.66% of 3)	1 (33.33% of 3)	All grades
Cause unknown . . . . .	1		6.37 years
Longest duration . . . . .	6.37 years	3 years	3.07 years
Shortest duration . . . . .	3.07 years		4.15 years
Average duration . . . . .	4.72 years		

##### Duration of life of patients after operation without removal of inguinal lymph-nodes

Patients concerning whom information was not received . . . . .	Grade 2	Grade 3	4 (36.36% of 11) 7 (63.63% of 11)
Patients concerning whom information was received . . . . .			
Patients living . . . . .			1 (18.18% of 7)
Good result . . . . .	1 (100 % of 1)		10.01 years
Patients dead . . . . .			6 (81.81% of 7)
Poor result . . . . .	2 (50.00% of 4)	2 (50.00% of 4)	All grades
Post-operative death . . . . .	1		8.83 years
Cause unknown . . . . .	1		0.84 year
Longest duration . . . . .	8.83 years	2.54 years	3.30 years
Shortest duration . . . . .	1.01 years	0.84 year	
Average duration . . . . .	4.92 years	1.69 years	

#### *Lesions of the penis*

##### Patients with metastasis operated on with removal of inguinal lymph-nodes

Patients concerning whom information was not received . . . . .	Grade 2	Grade 3	1 (25.00% of 4) 3 (75.00% of 4)
Patients concerning whom information was received . . . . .			
Patients dead . . . . .			3 (100 % of 3)
Poor result . . . . .	2 (66.66% of 3)	1 (33.33% of 3)	3 (100 % of 3)
Total poor result . . . . .			
Cause of death . . . . .			3 (100 % of 3)
Epithelioma . . . . .			

##### Patients without metastasis operated on with removal of inguinal lymph-nodes

Patients concerning whom information was not received . . . . .	Grade 1	Grade 2	Grade 3	6 (33.33% of 18) 12 (66.66% of 18)
Patients concerning whom information was received . . . . .				
Patients living . . . . .				5 (41.66% of 12)
Good result . . . . .	2 (50.00% of 4)	2 (50.00% of 4)		
Fair result . . . . .	1 (100 % of 1)			

ALBERT C. BRODERS

EPITHELIOMA OF THE GENITO-URINARY ORGANS—Continued  
GENERAL ULTIMATE RESULTS (ALL ORGANS)

*Lesions of the penis—Continued*

Patients without metastasis operated on with removal of inguinal lymph-nodes—Continued

	Grade 1	Grade 2	Grade 3	
Patients dead				
Good result	2 (66.66% of 3)	1 (33.33% of 3)		7 (58.33% of 12)
Poor result	2 (66.66% of 3)	1 (33.33% of 3)		
Cause unknown	1			
Total good result				7 (63.63% of 11)
Total fair result				1 (9.09% of 11)
Total poor result				3 (27.27% of 11)
			Cause of death	
Epithelioma				3 (50.00% of 6)
Old age				1 (16.66% of 6)
Paralysis				1 (16.66% of 6)
Cancer of the face				1 (16.66% of 6)

Patients operated on without removal of inguinal lymph-nodes

	Grade 2	Grade 3	
Patients concerning whom information was not received			3 (50.00% of 6)
Patients concerning whom information was received			3 (50.00% of 6)
Patients dead			3 (100% of 3)
Poor result	2 (66.66% of 3)	1 (33.33% of 3)	
Total poor result			3 (100% of 3)

Patients with metastasis and patients without metastasis operated on with removal of inguinal lymph-nodes and patients operated on without removal of inguinal lymph-nodes

	Grade 1	Grade 2	Grade 3
With metastasis		3 (75.00% of 4)	1 (25.00% of 4)
Without metastasis	2 (11.11% of 18)	12 (66.66% of 18)	4 (22.22% of 18)
Without removal of inguinal lymph-nodes at operation	1 (16.66% of 6)	4 (66.66% of 6)	1 (16.66% of 6)

Duration of lesion at the time of patient's examination at the Clinic

	Longest	Shortest	Average
Patients with metastasis	1.5 years	0.29 year	0.69 year
Patients without metastasis	5 years	0.33 year	1.77 years
Patients without removal of inguinal lymph-nodes	2 years	0.50 year	1.09 years

Size of lesion at the time of patient's examination at the Clinic

	Small	Medium	Large
Patients with metastasis	1 (25.00% of 4)	3 (75.00% of 4)	
Patients without metastasis	3 (21.42% of 14)	8 (57.14% of 14)	3 (21.42% of 14)
Patients without removal of inguinal lymph-nodes at operation	1 (25.00% of 4)	1 (25.00% of 4)	2 (50.00% of 4)
Not stated	6		

Duration of life after operation of patients with metastasis

	Grade 2	Grade 3	
Patients dead			3 (100% of 3)
Poor result	2 (66.66% of 3)	1 (33.33% of 3)	
Longest duration	1.03 years	0.41 year	All grades
Shortest duration	0.3 year		1.03 years
Average duration	0.66 year		0.3 year
			0.58 year

## EPITHELIOMA OF THE GENITO-URINARY ORGANS

### EPITHELIOMA OF THE GENITO-URINARY ORGANS—Continued GENERAL ULTIMATE RESULTS (ALL ORGANS)—Continued

#### *Lesions of the penis—Continued*

##### Duration of life after operation of patients without metastasis

Patients concerning whom information was not received .....	Grade 2	Grade 3	6 (33.33% of 18) 12 (66.66% of 18)
Patients concerning whom information was received .....			
Patients living .....	Grade 2	Grade 3	5 (41.66% of 12)
Good result.....	2 (50.00% of 4)	2 (50.00% of 4)	All grades 12.9 years 6.64 years 10.41 years
Longest duration.....	11.52 years	12.9 years	
Shortest duration.....	10.60 years	6.64 years	
Average duration.....	11.06 years	9.77 years	
Fair result.....	1 (100% of 1)		
Longest duration.....	8.8 years		
Patients dead.....	2 (66.66% of 3)	1 (33.33% of 3)	7 (58.33% of 12)
Good result.....			All grades 10.05 years 8.89 years 6.96 years
Longest duration.....	10.05 years	1.93 years	
Shortest duration.....	8.89 years		
Average duration.....	9.47 years		
Poor result.....	2 (66.66% of 3)	1 (33.33% of 3)	
Longest duration.....	2 years	2.35 years	2.35 years
Shortest duration.....	1.48 years		1.48 years
Average duration.....	1.74 years		1.94 years
Cause unknown.....	1		

##### Duration of life of patients after operation without removal of inguinal lymph-nodes

Patients concerning whom information was not received .....	Grade 2	Grade 3	3 (50.00% of 6) 3 (50.00% of 6)
Patients concerning whom information was received .....			
Patients dead .....	Grade 2	Grade 3	3 (100 % of 3)
Poor result .....	2 (66.66% of 3)	1 (33.33% of 3)	All grades 5.68 years 0.08 year 2.46 years
Longest duration .....	1.62 years	5.68 years	
Shortest duration .....	0.08 year		
Average duration .....	0.85 year		

EPITHELIOMA OF THE GENITO-URINARY ORGANS—Continued  
GENERAL ULTIMATE RESULTS (ALL ORGANS)—Continued

ALBERT C. BRODERS

*Lesions of the cervix*

Results following operation according to grade

	Grade 2	Grade 3	Grade 4	All grades
Patients concerning whom information was received	16 (69.56% of 23)	108 (73.97% of 146)	67 (77.01% of 87)	
Patients living	7 (43.75% of 16)	20 (18.51% of 108)	5 (7.46% of 67)	
Good result	7 (100% of 7)	20 (100% of 20)	5 (100% of 5)	32 (17.77% of 180)
Patients dead	9 (56.25% of 16)	88 (81.48% of 108)	62 (92.53% of 67)	
Good result	1 (12.5% of 8)	2 (2.43% of 82)	1 (1.72% of 58)	4 (2.22% of 180)
Poor result	7 (87.50% of 8)	80 (97.56% of 82)	57 (98.27% of 58)	144 (80.00% of 180)
Patients dead who obtained good results and patients dead who obtained poor results				148 (82.22% of 180)
Postoperative death				
Cause of death not stated				
Total good result	8 (53.33% of 15)	22 (21.56% of 102)	6 (9.52% of 63)	36 (20.00% of 180)
Total poor result	7 (46.67% of 15)	80 (78.43% of 102)	57 (90.47% of 63)	144 (80.00% of 180)

*Lesions of the bladder*

Results following operation according to grade

	Grade 1	Grade 2	Grade 3	Grade 4	All grades
Patients concerning whom information was received	16 (76.19% of 21)	34 (87.17% of 39)	26 (92.85% of 28)	21 (100% of 21)	
Patients living	9 (56.25% of 16)	10 (29.41% of 34)	7 (26.92% of 26)	2 (9.52% of 21)	
Good result	8 (88.89% of 9)	9 (90.00% of 10)	7 (100% of 7)	2 (100% of 2)	26 (37.14% of 70)
Fair result	1 (11.11% of 9)	1 (10.00% of 9)			2 (2.85% of 70)
Patients dead	7 (43.75% of 16)	24 (70.58% of 34)	19 (73.97% of 26)	19 (90.47% of 21)	
Good result	2 (66.67% of 3)	4 (40.00% of 10)	1 (6.25% of 16)	1 (7.69% of 13)	8 (11.42% of 70)
Poor result	1 (33.33% of 3)	6 (60.00% of 10)	15 (93.75% of 16)	12 (92.30% of 13)	34 (48.57% of 70)
Patients dead who obtained good results and patients dead who obtained poor results					42 (60.00% of 70)
Postoperative deaths					
Cause of death not stated					
				4	
				1	
				5	

## EPITHELIOMA OF THE GENITO-URINARY ORGANS

Total good result.....	10 (83.33% of 12)	13 (65.00% of 20)	8 (34.78% of 21)	3 (20.00% of 15)	34 (48.57% of 70)
Total fair result.....	1 (8.33% of 12)	1 (5.00% of 20)	1 (5.21% of 23)	2 (2.85% of 70)	2 (4.57% of 70)
Total poor result.....	1 (8.33% of 12)	6 (30.00% of 20)	15 (65.21% of 23)	12 (80.00% of 15)	34 (48.57% of 70)

### *Lesions of the labium*

#### Results following operation according to grade

	Grade 1	Grade 2	Grade 3	All grades
Patients concerning whom information was received.....	16 (72.72% of 22)	4 (25.00% of 16)	4 (80.00% of 5)	3 (17.64% of 17)
Patients living.....	4 (25.00% of 16)	3 (75.00% of 4)	1 (25.00% of 4)	1 (5.88% of 17)
Good result.....	3 (75.00% of 4)	1 (25.00% of 4)	.....	.....
Fair result.....	1 (25.00% of 4)	.....	.....	.....
Poor result.....	.....	.....	.....	.....
Patients dead.....	12 (75.00% of 16)	4 (100% of 4)	4 (100% of 4)	13 (76.47% of 17)
Poor result.....	9 (100% of 9)	4 (100% of 4)	4 (100% of 4)	13 (76.47% of 17)
Postoperative death.....	1 (100% of 1)	.....	.....	.....
Cause of death not stated.....	2	.....	.....	.....
Total good result.....	3 (23.06% of 13)	.....	.....	3 (17.64% of 17)
Total fair result.....	1 (7.69% of 13)	.....	.....	1 (5.88% of 17)
Total poor result.....	9 (69.23% of 13)	4 (100% of 4)	4 (100% of 4)	13 (76.47% of 17)

### *Lesions of the penis*

#### Results following operation according to grade

	Grade 1	Grade 2	Grade 3	All grades
Patients concerning whom information was received.....	1 (33.33% of 3)	11 (57.89% of 19)	6 (100% of 6)	.....
Patients living.....	1 (33.33% of 3)	3 (27.27% of 11)	2 (33.33% of 6)	.....
Good result.....	2 (66.67% of 3)	2 (66.67% of 3)	2 (100% of 2)	4 (23.52% of 17)
Fair result.....	1 (33.33% of 3)	1 (33.33% of 3)	1 (50.00% of 2)	1 (5.88% of 17)
Poor result.....	.....	.....	.....	.....
Patients dead.....	8 (72.72% of 11)	4 (66.67% of 6)	3 (17.64% of 17)	.....
Good result.....	2 (25.00% of 8)	1 (25.00% of 4)	9 (52.94% of 17)	.....
Poor result.....	6 (75.00% of 8)	3 (75.00% of 4)	12 (70.58% of 17)	.....
Patients dead who obtained good results and patients dead who obtained poor results.....	.....	.....	.....	.....
Cause of death not stated.....	1	.....	.....	.....

EPITHELIOMA OF THE GENITO-URINARY ORGANS—Continued  
GENERAL ULTIMATE RESULTS (ALL ORGANS)—Continued

ALBERT C. BRODERS

*Lesions of the penis—Continued*

Results following operation according to grade—Continued

Total good result .....	4 (36.36% of 11)	3 (50.00% of 6)	7 (41.16% of 17)
Total fair result .....	1 (9.09% of 11)	1 (5.88% of 17)	1 (5.88% of 17)
Total poor result .....	6 (54.54% of 11)	3 (50.00% of 6)	9 (52.94% of 17)

*Lesions of the vagina*

Results following operation according to grade

	Grade 3	Grade 4	All grades
Patients concerning whom information was received	3 (50.00% of 6)	3 (42.85% of 7)	
Patients living	1 (33.33% of 3)	1 (33.33% of 3)	
Good result	1 (100% of 1)	1 (100% of 1)	2 (33.33% of 6)
Patients dead	2 (66.66% of 3)	2 (66.66% of 3)	
Poor result	2 (100% of 2)	2 (100% of 2)	4 (66.66% of 6)
Total good result	1 (33.33% of 3)	1 (33.33% of 3)	2 (33.33% of 6)
Total poor result	2 (66.66% of 3)	2 (66.66% of 3)	4 (66.66% of 6)

*Lesions of the urethra*

Results following operation according to grade

	Grade 2	Grade 3	All grades
Patients concerning whom information was received	1 (50.00% of 2)	2 (100% of 2)	
Patients living		1 (50.00% of 2)	
Good result		1 (100% of 1)	1 (33.33% of 3)
Patients dead		1 (50.00% of 1)	
Poor result		1 (100% of 1)	
Total good result		1 (50.00% of 2)	2 (66.66% of 3)
Total poor result		1 (100% of 1)	1 (50.00% of 2)

# EPITHELIOMA OF THE GENITO-URINARY ORGANS

*Lesions of the kidney*  
Results following operation according to grade

	Grade 2	Grade 4
Patients concerning whom information was received .....	1 (100 % of 1)	1 (100 % of 1)
Patient dead .....	1 (100 % of 1)	1 (100 % of 1)
Poor result .....	1 (100 % of 1)	1 (100 % of 1)

*Lesions of the ovary*  
Results following operation according to grade

	Grade 2	Grade 4
Patients concerning whom information was received .....	1 (100 % of 1)	1 (100 % of 1)
Patient dead .....	1 (100 % of 1)	1 (100 % of 1)
Poor result .....	1 (100 % of 1)	1 (100 % of 1)

**LESIONS OF ALL ORGANS**

Results following operation according to grade

	Grade 1	Grade 2	Grade 3	Grade 4	All grades
Patients concerning whom information was received .....	17 (70.83% of 24)	79 (73.83% of 107)	149 (77.20% of 193)	92 (80.00% of 115)	
Patients living .....	9 (52.94% of 17)	24 (30.37% of 79)	31 (20.80% of 149)	8 (8.69% of 92)	
Good result .....	8 (88.88% of 9)	21 (87.50% of 24)	31 (100% of 31)	8 (100% of 8)	68 (23.05% of 295)
Fair result .....	1 (11.11% of 9)	3 (12.50% of 24)			4 (1.35% of 295)
Patients dead .....	8 (47.05% of 17)	55 (69.65% of 79)	118 (79.19% of 149)	84 (91.30% of 92)	
Good result .....	2 (66.66% of 3)	7 (18.91% of 37)	4 (3.66% of 109)	2 (2.70% of 74)	
Poor result .....	1 (33.33% of 3)	30 (81.08% of 37)	105 (96.33% of 109)	72 (97.29% of 74)	15 (5.08% of 295)
Postoperative deaths .....	1	11	6	5	208 (70.50% of 295)
Cause of death not stated .....	4	7	3	5	
Patients dead who obtained good results and patients dead who obtained poor results .....	10 (83.33% of 12)	28 (45.90% of 61)	35 (25.00% of 140)	10 (12.19% of 82)	223 (75.59% of 295)
Total good result .....	10 (83.33% of 12)	3 (4.91% of 61)	105 (75.00% of 140)	72 (87.80% of 82)	83 (28.13% of 295)
Total fair result .....	1 (8.33% of 12)	30 (49.18% of 61)			4 (1.35% of 295)
Total poor result .....	1 (8.33% of 12)				208 (70.50% of 295)

EPITHELIOMA OF THE GENITO-URINARY ORGANS—Continued  
LESIONS OF ALL ORGANS—Continued

*Lesions of the cervix*

Duration of life after operation according to grade

Patients concerning whom information was received		Grade 2			Grade 3			Grade 4			All grades		
Patients living													
Good result		7			14.11 years			5			32		
Longest duration		6.11 years			16.15 years			15.62 years					
Shortest duration		9.64 years			5.25 years			5.76 years					
Average duration					9.40 years			8.59 years			9.32 years		
Patients dead					1			1			148		
Good result					2			10.00 years					
Longest duration					4.16 years			6.72 years					
Shortest duration					7.08 years			57			6.05 years		
Average duration					80			3.91 years					
Poor result		7			2.37 years			0.12 year			0.22 year		
Longest duration		0.5 year			7.19 years			1.12 years			1.27 years		
Shortest duration		1.32 years			0.12 year			1.39 years					
Average duration											8.96 years		
Patients concerning whom information was received													
Good result		8			14.7 years			7			2		
Longest duration		3.58 years			12.7 years			11.09 years			5.75 years		
Shortest duration		8.08 years			2.72 years			5.4 years			5.67 years		
Average duration		1			7.65 years			7.29 years			7.54 years		
Fair result								1			6.75 years		
Longest duration											7.2 years		
Average duration													

## EPITHELIOMA OF THE GENITO-URINARY ORGANS

Patients dead .....	2	6.58 years	4	11.54 years	1	9.27 years	1	6.00 years	1	6.26 years	42
Good result .....											
Longest duration .....		6.10 years		2.15 years							
Shortest duration .....		6.34 years		5.52 years							
Average duration .....		6.34 years		5.52 years							
Poor result .....	1	2.86 years	6	2.65 years	15	3.75 years	12	2.45 years			
Longest duration .....				0.10 year		0.17 year		0.15 year			
Shortest duration .....				1.35 years		1.28 years		0.95 year			
Average duration .....											
Average duration of life of all patients (living and dead) who obtained good results .....											7.24 years

### *Lesions of the labium*

Duration of life after operation according to grade

Patients concerning whom information was received

Patients living .....											17
Good result .....											
Longest duration .....											
Shortest duration .....											
Average duration .....											
Poor result .....											
Longest duration .....											
Shortest duration .....											
Average duration .....											
Patients dead .....											
Poor result .....											
Longest duration .....											
Shortest duration .....											
Average duration .....											

### *Lesions of the penis*

Duration of life after operation according to grade

Patients concerning whom information was received

Patients living .....											17
Good result .....											
Longest duration .....											
Shortest duration .....											
Average duration .....											
Poor result .....											
Longest duration .....											
Shortest duration .....											
Average duration .....											
Patients dead .....	2	11.52 years					2	12.90 years			

EPITHELIOMA OF THE GENITO-URINARY ORGANS—Continued  
LESIONS OF ALL ORGANS—Continued

	Duration of life after operation according to grade—Continued		
	Grade 2	Grade 3	All grades
Shortest duration	10.66 years 11.09 years	6.64 years 9.76 years	10.42 years
Average duration			
Poor result	8.80 years		
Longest duration			12
Patients dead			
Good result			
Longest duration	10.05 years 8.89 years	1.93 years	
Shortest duration	9.47 years		
Average duration			
Poor result	6	3	6.95 years
Longest duration	2.0 years	5.68 years	
Shortest duration	0.08 year	0.41 year	
Average duration	1.08 years	2.81 years	1.66 years
Average duration of life of all patients (living and dead) who obtained good results			8.94 years

*Lesions of the vagina*

Duration of life after operation according to grade

	Duration of life after operation according to grade		
	Grade 3	Grade 4	All grades
Patients concerning whom information was received			6
Patients living			
Good result			2
Longest duration			
Average duration		1 5.73 years	8.32 years
Patients dead			
Poor result			
Longest duration	2	2 0.92 year	4
Shortest duration		0.79 year	
Average duration		0.33 year	
		0.37 year	0.61 year

EPITHELIOMA OF THE GENITO-URINARY ORGANS

*Lesions of the urethra*  
Duration of life after operation according to grade

Patients concerning whom information was received	Duration of life after operation according to grade		
	Grade 2	Grade 3	All grades
Patients living			
Good result		1	1
Longest duration		5.56 years	
Patients dead			2
Poor result		1	
Longest duration	0.35 year	3.41 year	
Average duration			1.88 years

*Lesions of the kidney*  
Duration of life after operation according to grade

Patients dead	Duration of life after operation according to grade	
	Grade 2	Grade 3
	Poor result	1
Longest duration		0.33 year

*Lesions of the ovary*  
Duration of life after operation according to grade

Patients dead	Duration of life after operation according to grade	
	Grade 4	Grade 3
	Poor result	1
Longest duration		0.75 year

## EPITHELIOMA OF THE GENITO-URINARY ORGANS—Continued

## Lesions of all Organs

## Duration of life after operation according to grade

Patients concerning whom information was received		295		
	Grade 1	Grade 2	Grade 3	Grade 4
Patients living				All grades
Good result	8	21	31	72
Longest duration	14.7 years	14.11 years	16.15 years	
Shortest duration	3.58 years	2.72 years	5.40 years	
Average duration	8.08 years	8.58 years	8.98 years	8.58 years
Fair result	1	3		
Longest duration	7.65 years	8.80 years		
Shortest duration		4.25 years		
Average duration		6.60 years		8.43 years
Patients dead				223
Good result	2	7	4	
Longest duration	6.58 years	11.54 years	10.00 years	6.72 years
Shortest duration	6.10 years	2.15 years	1.93 years	6.00 years
Average duration	6.34 years	6.34 years	6.34 years	6.36 years
Poor result	1	30	105	72
Longest duration	2.86 years	8.83 years	7.19 years	3.91 years
Shortest duration		0.08 year	0.12 year	0.15 year
Average duration		1.66 years	1.43 years	1.06 years
Average duration of life of all patients (living and dead) who obtained good results				8.17 years

## CARCINOMATOUS PAPILLOMA OF THE RENAL PELVIS\*

BY LYNDON HOLT LANDON, M.D.

AND

NICHOLAS M. ALTER, M.D.

OF PITTSBURGH, PA.

FROM THE SURGICAL DIVISION AND PATHOLOGICAL DEPARTMENT OF THE WESTERN PENNSYLVANIA HOSPITAL

CERTAIN clinical and pathological features make the case herein reported one of unusual interest. They serve to emphasize the difficulty in making the diagnosis, and they throw some light on the clinical nature of this apparently rare condition. At the same time they clarify somewhat our conception of its pathology, concerning which so much confusion exists in the literature, particularly from the standpoint of its nomenclature.

The chief points of interest in this case are:

1. The difficulty in obtaining the diagnosis on account of the complete absence of haematuria and vagueness of many other symptoms immediately referable to kidney tumor.
2. The value and difficulty of pyelography in the diagnosis of kidney tumor.
3. The extensive destruction of the kidney brought about by the growth originating from the pelvic epithelium.
4. The marked fibrous tissue production, scirrhus-like nature of the papilloma, when invading and destroying the kidney tissue.
5. The absence of any discoverable metastasis up to this time, nine months after operation, notwithstanding the presence of tumor thrombi in the veins of the kidney parenchyma.

**CASE REPORT.**—Mr. R. G. P. (W. P. H., No. 5649), a broker, married, aged thirty-eight, was first seen by one of us (L. H. L.) at 6 P.M. December 31, 1920, in consultation with his physician, Dr. R. T. Hood. During the preceding week he had been vaguely conscious of a sensation of fulness and heaviness, but no pain, in the upper left abdomen. Aside from this he had been in his usual good health until four hours prior to his admission to the hospital, when he was suddenly attacked by weakness, followed almost immediately by excruciating stabbing pain in the left hypochondrium, radiating downward and backward over the crest of the ilium, but not to the groin or testicle. There had been no bladder irritability, although he had voided once since the attack began, when the urine showed no gross changes from the normal. During the four hours morphine had been administered twice with but little effect upon the intensity of pain. While on the way to the hospital he had vomited twice.

Eighteen months before Mr. P. had suffered a somewhat similar attack of pain in the left upper abdomen with the same radiation. This attack had lasted but half an hour, was attributed to indigestion, and was apparently relieved by

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\* Read before the Philadelphia Academy of Surgery, October 3, 1921.

## LANDON AND ALTER

the application of an ice bag to the side and Jamaica ginger internally. There had been no disturbance of micturition at this time, nor during the interval between the attacks. Never to his knowledge had the urine contained blood.

With this exception there was nothing suggestive in the past history of this patient. Aside from habitual constipation and constant employment of cathartics, there were no symptoms referable to the gastro-intestinal tract. His appetite had remained good and his weight, 145 pounds, had not varied. During the past five years his complexion, formerly clear and fair, had become sallow, but during this time his occupation kept him confined indoors with but little opportunity for exercise and proper elimination. Two years before he had contracted a Neisserian infection with a resulting chronic prostatitis for which he had been treated irregularly. He was moderate and regular in his habits. There was nothing significant in the family history.

When seen at the hospital Mr. P. was still suffering from what had evidently been profound shock. His features were pinched, his expression anxious, his attitude nervous, while he complained of the stabbing pain in the left hypochondrium. The temperature was 98° Fahrenheit, pulse 110, respirations thirty-two. The mucous surfaces were pale, his skin cool, moist, and distinctly sallow. The conjunctivae were clear. The general nutrition was good though his musculature showed the results of a sedentary life.

The abdomen was not distended, but diaphragmatic respiration, especially on the left, was greatly inhibited. Efforts at deep inspiration increased the paroxysms of pain. Tenderness and rigidity of the left upper abdomen resisted deep palpation or the determination of a mass. The rigidity and tenderness were confined to the left and examination of the remaining abdomen was negative. There was definite although not extreme tenderness in the left costo-vertebral angle, but none along the course of the ureter. The abdomen was tympanitic throughout, but peristalsis somewhat inhibited.

Examination of the chest was entirely negative except at the left base posteriorly, where an area of dullness extended to the upper border of the tenth rib. Over this area the breath sounds were indistinct. Vocal and tactile fremitus, however, were not increased and no râles or pleural rub could be elicited. There were no abnormal cardio-vascular findings. Blood-pressure was 150 mm. systolic, 85 mm. diastolic.

Rectal examination of the prostate showed this gland to be moderately enlarged, somewhat boggy and tender. The urine upon admission was cloudy, acid, had a specific gravity of 1.020, showed a trace of albumen, no sugar, contained a few granular casts, some epithelial cells, no red blood-cells and few white blood-cells. Examination of the blood revealed a leucocytosis of 16,200, a differential count of eighty-eight per cent. polymorphonuclears, eight per cent. small lymphocytes, and four per cent. large mononuclears. There was seventy per cent. haemoglobin, and 3,350,000 red cells. A provisional diagnosis of pyonephrosis with ureteral obstruction from stone or kink was made and the patient placed under the appropriate palliative treatment.

On the following day he was much improved. The pain had subsided to a dull, heavy aching. He had voided 1100 c.c. during the twenty-four hours following admission. This urine was clear, with a specific gravity of 1.023, was negative for albumen, contained many white blood-cells, only an occasional red blood-cell, and no casts. The rigidity of the upper abdomen had disappeared and a distinct mass having the outlines of the kidney, but much enlarged and very tender, could be easily palpated. On January 3, 1921, the phenolsulphonephthalein functional test of the bladder urine showed 63.6 per cent. during the first hour, and a total of 76.8 per cent. for the two hours.

Cystoscopic examination by Dr. A. I. Murphy showed a bladder of normal

## CARCINOMATOUS PAPILLOMA OF THE RENAL PELVIS

capacity, with no undue irritability, a moderate trigonitis, a normal vesicle sphincter and no evidence of calculus or tumor. Both ureteral orifices were normal in appearance, but nothing was coming from the left ureter. The ureters were catheterized and a specimen obtained from the right for examination. No flow was obtained from the left ureter.

X-ray examination revealed normal conditions of the right kidney in every respect. Collargol was instilled into the left ureter with ease, but apparently most of the solution escaped back into the bladder from around the catheter. It was not until increased force was used for the injection that a pyelogram of importance was obtained. The interpretation of it, however, was quite difficult. There was, namely, a  $\beta$ -shaped shadow with vague and irregular outlines, and leaving large "defects in filling" the pelvis. This shadow was somewhat thicker in its upper portions. The entire ureter was slightly but uniformly dilated (Fig. 8). The urine from the right kidney contained some amorphous substances, an occasional red blood-cell and white blood-cell, no casts, and some epithelial cells. Smear and culture were negative for bacteria, including tubercle bacilli.

From this time on up to the day of operation there was a gradual improvement in the patient's general condition. He voided 1400 to 1500 c.c. of urine daily, which continued to contain a few pus cells, but inasmuch as nothing was coming from the left ureter, this was attributed to the prostatic condition, even though at this time the possibility of pyonephrosis was thought of. Immediately following the cystoscopic examination red blood-cells were found in very few numbers, as would be expected. There was no recurrence of the pain and the sensation of fulness and the aching in the left hypochondrium had nearly disappeared. There were no changes in the palpable tumor in the last days prior to operation.

*Operation.*—On January 10, 1921, the kidney was exposed through the ordinary lumbar incision. Upon exposure the kidney was found to be greatly enlarged, semi-cystic to palpation and quite firmly glued to the surrounding structures by inflammatory adhesions, especially at the upper pole, where it was separated with difficulty. The major portions of the organ lay above the level of the costal margin, pushing the diaphragm upward and obviously accounting for the physical findings at the left base resulting from compression of the corresponding portion of the lung. The delivery of so large a kidney through the lumbar incision was accomplished only with difficulties, increased by the efforts to avoid rupture of the cystic tumor. At the instant of delivery a small rent did occur in the capsule through which a considerable quantity of thick, hemorrhagic fluid escaped. Examination of the pelvis showed this to be dilated and cystic down to 3 or 4 cm. below the uretero-pelvic juncture. Below this the ureter was normal in size and appearance. No stone could be palpated. The vessels of the pedicle were normal. The large veins were not thrombotic and no enlarged glands were palpable. About 7 cm. of the upper ureter were removed with the kidney. The wound was closed with drainage, which had been entirely removed on the fifth day. At the end of the week the stitches were removed, and healing was complete. The patient enjoyed an uneventful recovery. Mr. P. was discharged from the hospital on January 29th. Since that time he has been seen frequently. He has gained some ten pounds in weight, has worked daily since March, and is apparently in good health.

*Pathological Report.*—Macroscopical examination: Specimen consists of a kidney, which weighs 610 grams. Measures 19 x 10 x 8 cm. The kidney is uniformly enlarged. Its characteristic shape is lost on account of the ragged surface, which is covered with thick fibrous bands, especially on the lower half, where the fatty capsule is inseparable from the kidney itself. The upper half has a dark, reddish-brown color and is cystic in appearance. There is a narrow tear (1 cm.

in length) from which thick, hemorrhagic fluid is oozing. The lower half is very firm. The stump of the ureter is imbedded in large amount of scar tissue surrounding the pelvis. The ureter measures about 7 cm. in length. The ureter is club-shaped and shows a swelling towards the pelvis. At the surgical incision it has normal calibre. On cross-section of the specimen a large amount of dark brown, thick, hemorrhagic material is discharged. After washing off the exudate a villous growth is seen lining the upper portion of the ureter and pelvis (Fig. 1). This growth is apparently replacing most of the kidney. Surrounding the upper portions of the kidney and separating this from the capsule there is a round hemorrhagic cavity. In the lower portions some uniformly brown kidney tissue is seen. The periphery of this has no sharp outlines and cannot be distinguished from the scar tissue surrounding it. This scar tissue consists mostly of tendinous fibrous tissue interwoven with transparent gray tissue and shows gradual transition into the surrounding fatty tissue. The structure of the kidney is entirely lost. There is a large cavity occupying most of the kidney. This is subdivided by outstanding fibrous columns, which thus remind one of the structure of hydronephrosis, overshadowed by the growth. A papillary growth lines the surface of the cavity, which is continuous with the pelvis and ureter. The growth has a sharp border line in the ureter about 4 cm. above the surgical incision. Above this the fine papillary growth is seen with velvety surface. This consists of fine tassel-like projections, which float when placed in water. The growth extends upward into the pelvis, but there the uniform fine appearance of the projections is gradually lost. It has rather a warty appearance. The villi are changed into irregularly thickened mushroom-like projections. These are very friable and at places dark, dirty green in appearance; they are covered mostly with necrotic material and blood clot. In the upper portion only a thin wall of fibrotic appearance and measuring 3 mm. in thickness, separates the growth from the surrounding hemorrhagic cavity. This wall shows grossly no suggestion of normal kidney tissue. In the lower portion the growth radiates downward into the tendinous scar tissue. No sharp outlines of it are here seen. There is but a small island measuring about 3 cm. in diameter, which on account of its brown color and soft consistency, seems to be the remnants of the kidney parenchyma.

*Microscopical Examination.*—Section of the upper portion of the ureter shows the abrupt beginning of a papillary growth (Fig. 2). Up to where the growth begins normal, urogenital epithelial covering is seen. The growth consists almost entirely of fine filiform projections. The stalks of these are covered with a uniform layer of stratified transitional epithelium. The basement membrane of the growth corresponds with that of the normal epithelial lining. This base-line is sharp and straight. There is no epithelial invasion of the stroma at this area. The centres of the stalks contain the blood-vessels and these are surrounded by loose connective tissue. There are ten to twenty-five layers of epithelial cells covering the surface. The cells are mostly cuboidal, and rather regular in shape and size. The basal layer is cylindrical (Fig. 3). There is very slight lymphocytic reaction at the base of the growth. Sections taken higher up from the pelvis of the kidney at different levels show always more and more irregularity of the papillæ as well as of the epithelial cells themselves. The papillary projections are not straight and short, but club-shaped, and have irregular branching. The surface epithelium is irregularly thickened. The epithelial cells are getting more and more irregular in shape and size. There are numerous giant-cells, and especially at the base of the growth very numerous mitotic figures are seen, some of which are also atypical and multipolar. There is a great variety in staining property of the cells, some are very pycnotic, others are pale. There is no sharp line of demarcation, but always more and more invasion of the malignant epithe-

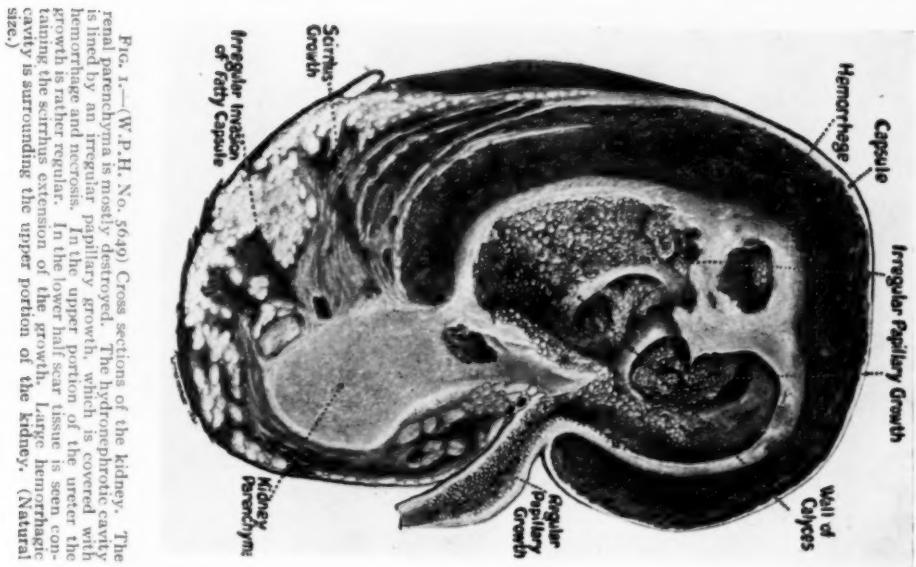


FIG. 1.—(W.P.H. No. 5049) Cross sections of the kidney. The renal parenchyma is mostly destroyed. The hydronephrotic cavity is lined by an irregular papillary growth, which is covered with hemorrhage and necrosis. In the upper portion of the ureter the growth is rather regular. In the lower half scar tissue is seen containing the scirrhous extension of the growth. Large hemorrhagic cavity is surrounding the upper portion of the kidney. (Natural size.)

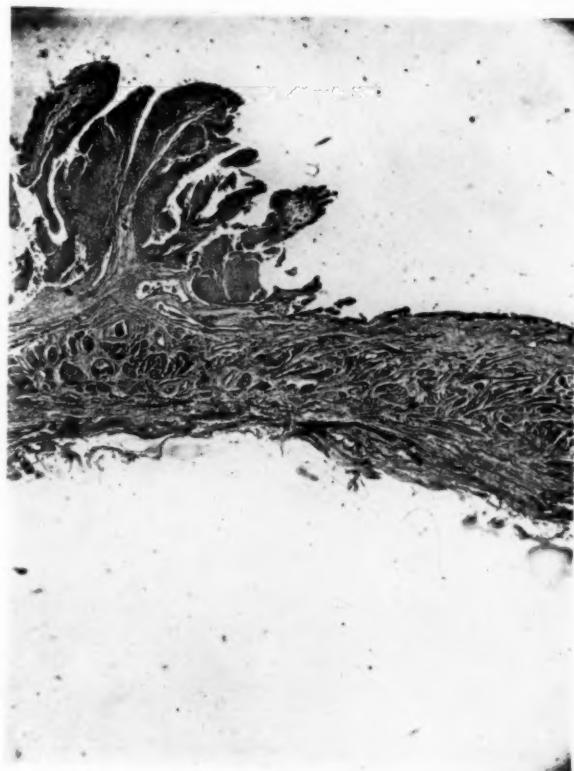


FIG. 2.—The abrupt border of the growth in the ureter showing the typical urogenital papilla, with being a appearance at this place.

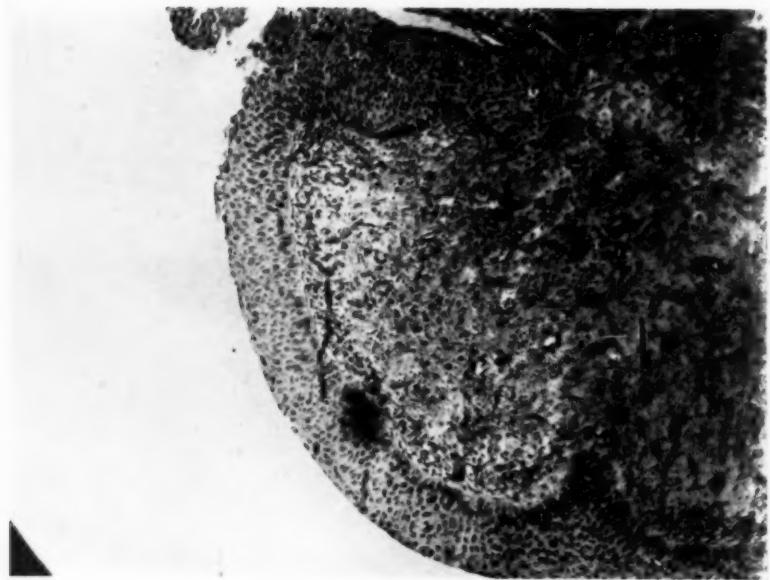


FIG. 3.—The tip of the papillæ seen in Fig. 2.

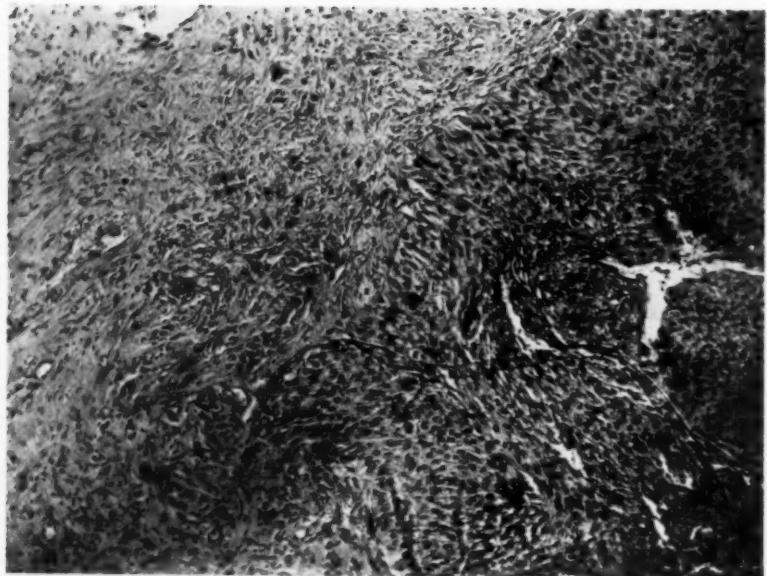


FIG. 4.—The broken-down basement membrane and the irregular medullary growth; section was taken from the wall of the calyx.

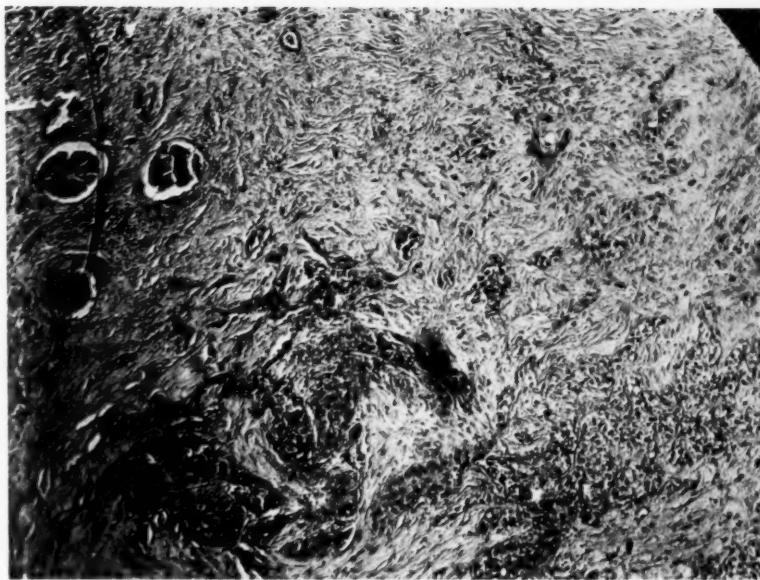


FIG. 5.—The growth with scirrhus character. Dense fibrosis is seen not only surrounding the growth, but also the glomeruli. Section was taken from the scar-like tissue at the lower pole of the kidney.

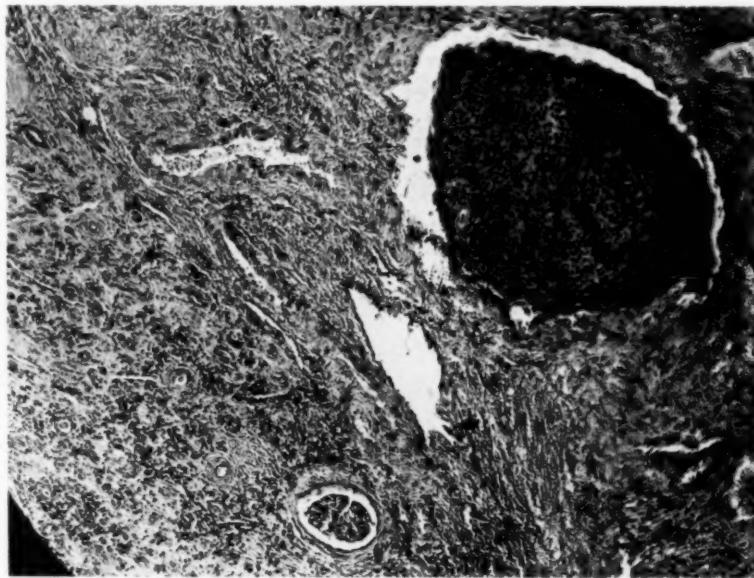


FIG. 6.—The tumor thrombus in a larger vein. Dense fibrosis is surrounding the atrophied tubuli.

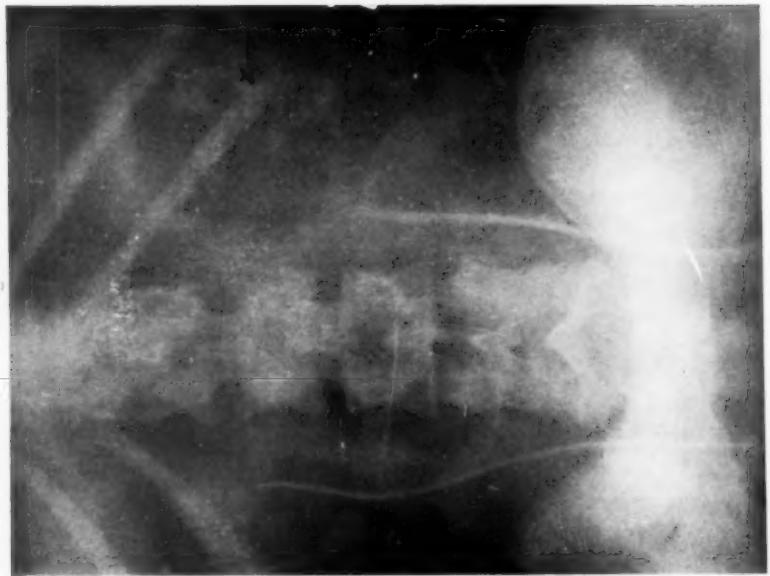


FIG. 8.—Colston's "filling defect" in the pyelogram. A J-shaped shadow is outlining the large irregular and empty pelvis.



FIG. 7.—High-power magnification of the vessel wall and thrombus

## CARCINOMATOUS PAPILLOMA OF THE RENAL PELVIS

lum into the kidney tissue (Fig. 4). The epithelial invasion around the border of the pelvis and dilated calyces shows arrangement in solid medullary alveoli. The surrounding stroma contains marked lymphocytic reaction with occasional eosinophile leucocytes. Section taken from the wall separating the growth from the hemorrhagic cavity, shows a very striking picture. On the inner surface papillary projections are seen with extensive surface necrosis and hemorrhage. At the base the malignant nature of the epithelial growth is obvious, on account of the irregular large medullary invasion, through the broken-down basement membranes. The wall itself consists mainly of dense fibrous tissue. Only the irregularly scattered glomeruli will remind one of the origin of the tissue (Figs. 5 and 6). The glomeruli appear sometimes in clumps and show great variety in size. Some are atrophied, small and fibrotic, others are still large with a distinct Bowman capsule. The surrounding tissue shows only dense fibrosis, which is partly hyalinized and contains rich lymphocytic reaction. Narrow strands of small epithelial cells here and there suggest the former tubuli. These are scarce and their lumen, if present, is very narrow, but mostly no lumen is found. The outer surface towards the hemorrhagic cavity is covered with organizing blood clot. The picture of the organization is quite striking. From the surface of the kidney masses of fibroblasts are invading the blood clot. There are also young capillaries and numerous round cells. Sections taken of the lower half of the kidney, which in the gross showed scar-like character, demonstrate clearly the invasive nature of the growth (Fig. 5). There are but small, spiked islands of epithelial cells, which are altogether smaller and darker. The greater portion of the growth is arranged in narrow irregular strands, which branch out irregularly and are compressed and surrounded by dense, partly hyalinized fibrous tissue. This picture, on account of the nature of the cells and characteristic structure, resembles that of a scirrhus carcinoma of the breast to great degree. Section taken from the surface of the lower portions of the cavity shows very extensive necrosis of the surface layers. The small vessels found, show sclerotic changes of their wall with narrowing of the lumen. Some larger veins contain thrombi formed by tumor cells (Figs. 6 and 7). These thrombi are partly necrotic and contain irregular epithelial cells. On the corresponding side the endothelial lining of the vein is destroyed and the thrombus is adherent to the wall of the vessel.

*Diagnosis.*—Ordinarily three classic symptoms, essential haematuria, pain with characteristic radiation, and palpable mass are deemed sufficient in arriving at the diagnosis of kidney tumor.

The essential haematuria is unquestionably the most valuable clue, and sometimes is the first symptom to force the patient to consult a physician. This is to be confirmed by cystoscopy, when also the pathological changes of the ureteral orifice are found and the secretion directly obtained can be analyzed from many standpoints. The haematuria varies in amount, sometimes it is very scarce and intermittent, or so copious as to lead to the death of the patient (Rayer's case). On the other hand, there are but few cases reported without any haematuria (Matsuoka, Neelsen). The haematuria may be early or late in the course of disease. In our case the most careful investigation revealed no haematuria whatsoever. Not only the questioning of the patient, but careful repeated examination during this observation were futile in this respect. Careful inspection of the gross specimen will give, however, a very plausible explanation for this peculiar feature. Two large hemorrhagic cavities are seen, namely one within and one outside of

the kidney. As seen in Fig. 1 a hemorrhagic cavity of considerable size has separated the capsule from the kidney. Neelsen reported a very similar case without any haematuria, but also with just such an extensive "hemorrhagic perinephritis." The hydronephrotic and cystic appearance of the kidney is the evidence of early obstruction leading to complete cessation of kidney secretion. With this anatomical finding the cystoscopic examinations are in good agreement as no secretion was obtained from the corresponding ureter. Hemorrhages did occur perhaps continuously into the central cavity of the growth as well as into the wide cavity surrounding the larger portion of the kidney.

The nature of the pain as usually seen in the kidney tumors shows a uniform picture. There is a dull pain over the corresponding flank. This may be very mild and continuous for a period, then suddenly colicky attacks may occur. These are quite similar to those seen in cases of nephrolithiasis. The colicky pains, when typical, radiate downward to the groin or testicle, apparently in the direction of the ureters. In cases of nephrolithiasis this indicates the passing of stones. In cases of kidney tumor blood clots are passed through increased peristalsis. In our case dull pain in the flanks can be traced for one to two years. It was often so mild, that it amounted to a sensation of fullness and heaviness in the upper left abdomen. The colicky attacks, however, differed greatly from the descriptions usually given in such cases. The best opportunity for observation of this kind was offered at the time of admission. It gave a typical picture of profound shock and was not unlike that seen in cases of internal bleedings with sudden anaemia of the visible mucous membranes, and typical collapse of the patient. At this time the patient had great stabbing pain in the corresponding flank, which, however, did not show any characteristic radiation. The distention and pressure caused by the growth of the tumor had been naturally responsible for the dull pain and sensation of heaviness. As nothing passed down the ureter, the characteristic radiation of the pain was absent. The hemorrhage was the cause of course of the secondary anaemia. This, however, without loss in weight and strength, gave no definite information as to the diagnosis.

The enlargement of the kidney may become palpable in quite an early stage. In his eighty-three cases of adults, Heresco found nineteen times the irregular enlargement the first symptom of renal neoplasm. Albarran calls attention to the fact that this is still more frequent in children. The enlargement is most suggestive when it is irregular, nodular. It may be, however, hidden under the diaphragm, sitting on the upper pole of the kidney, or the enlargement may be uniform, with a smooth surface, as it was in our case.

Albarran in his report of three cases claims to have made a definite diagnosis of pelvic papilloma before operation, differentiating them from the other neoplasms. According to Albarran such criteria of differential diagnosis are: (1) Haematuria with excretion of neoplastic cells in

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the urine. "The urine may reveal numerous atypical cells, which are very rare in other renal tumors." (2) Atypical cells directly obtained through the ureter catheter. Absence of pus is, however, required because marked epithelial desquamation may be confusing in cases of various pyelitis. (3) Papillomatous growth at the corresponding ureteral orifice with the other renal symptoms.

As in our case there had been no secretion from the corresponding ureter, Albarran's above criteria did not aid us in the differential diagnosis.

Recent advances in pyelography introduce a valuable aid in the diagnosis of renal protoplasm. "Colston's filling defect" in the pyelogram gives a very characteristic picture. It can be brought out, however, only with careful technic and repeated examinations. After some unsuccessful attempts some pressure had to be applied to force the collargol into the pelvis. The result was striking as Fig. 8 shows; large portions of the pelvis remained empty. Only a 3-shaped shadow indicated the irregular lateral outlines. At the same time these X-ray examinations excluded definitely the existence of stones.

The cystoscopic examination, as Albarran points out, ought to be of great importance, but it failed us completely, as no secretion whatsoever was obtained from the corresponding ureter. The ureteral orifice showed no pathological changes (growth, ulceration, hemorrhage, etc.).

The urine examination of course reflected only the work of the other kidney, and showed every evidence of good function of that side. Seventy-six and eight-tenths per cent. total secretion of phenolsulphonephthalein for two hours was an indication of good compensating power of that kidney. All these considerations made it possible to arrive at the diagnosis of a kidney enlargement due possibly to hydroponephrosis or neoplasm, or both affections.

*Pathology.*—There is very great confusion in the literature in regard to the classification of the neoplasms of the renal pelvis. Essentially there are only two epithelial tumors, both deriving from the urogenital epithelium of the pelvic lining: Benign papilloma and malignant carcinomatous papilloma. When termed malignant, it may still show some of the papillary character and may also show, however, medullary or scirrhotic invasion into the surrounding tissue. The surface epithelium of the urogenital tract may undergo metaplasia and change from transitional to squamous epithelium. This in turn may give rise to keratinizing epidermoid carcinoma with pearl formation. Such growth is often also called papillary epithelioma (Kischensky). The various classifications of the investigators are sufficient to show the confusion. Hryntschak, in a study which he based on the collection of sixty-nine cases including his own, classifies pelvic papillomata in three groups: (1) Questionably benign. (2) Unquestionably benign. (3) In transition to malignancy. Albarran and Imbert divide their collection of fifty-four pelvic epithelial tumors also into three classes: (1) Papilloma. (2) Papillary epithelioma. (3) Non-papillary epithelioma. To demonstrate clearly the

confusion, it is interesting also to quote from recent literature. McCown, in his paper "Papillomatous Epithelioma of Kidney Pelvis," reports a case with the following microscopic pathological description. "At no point is the epithelial growth found to break through and invade the kidney substance. The epithelial cells are quite regular in size, shape and arrangement. They are elongated, almost columnar, in shape. They are arranged upright or at right angles to their supporting stroma, in which particular they differ from the arrangement of ordinary squamous epithelium." . . . "There are no areas of necrosis or hemorrhage." In McCown's case there is no keratinization at any point, and the urogenital nature of the growth is still clearly shown everywhere. There is no resemblance at all to epidermal carcinoma and still it is termed epithelioma, although it has also preserved its papillomatous nature throughout without malignant invasion. In the foreign literature De Josselin De Long reports "A case of papillary carcinoma of the renal pelvis," in which he puts particular emphasis on the fact that the growth has not invaded the kidney tissue, but produced secondary atrophy of it by pressure. To call a renal papilloma carcinomatous, it is necessary to find the characteristic malignant features: at least, anaplasia, rapid growth of cells (mitotic figures), definite breaking down of the basement membrane and invasion of surrounding tissues. Metastasis of urogenital papilloma is not frequent; extension, transplantation, and recurrence may, however, occur more commonly. It is interesting to note that in many cases where metastasis occurred the urogenital epithelial cells underwent such considerable malignant changes that its histogenesis was scarcely traceable. Graupner called his two cases "infiltrative carcinoma" of the pelvis because the papillary structure was practically lost and careful investigation was necessary to reveal its origin. In both of his cases extensive metastasis occurred: in lymph-glands, liver, lungs, adrenals, and brain. Kischensky reported a case with extensive metastasis of the metaplastic pelvic epithelioma with marked keratinization.

On the other hand, not all of the papillary growths derive from the renal pelvis; they may take their origin from the kidney parenchyma proper (renal tubuli) and still show a papillary surface. These are papillary adenocarcinomata.

In our case the portions of the growth near the ureter show distinct papillary character (Fig. 2). The surface epithelium covering the projections is here still quite uniform and regular without any invasion. In the calyces, however, where the papillæ have a more wart-like appearance, the tumor cells show not only a great deal of irregularity in size and shape, but very numerous mitotic figures are found, including multipolar shapes, and the invasive character of the growth is most pronounced. Near the ureter the invasion is of medullary nature (Fig. 4). In the more distant places the scirrhotic character of the growth is very striking. Dense fibrous tissue is surrounding the narrow strands of the malignant epithelium. This stroma is partly hyalinized and contains rich lymphocytic reaction. The

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fibrosis is not only found surrounding the growth, but also in the remnants of the kidney tissue where very little of the tubular structures are left (Figs. 7 and 8). Necrosis is particularly extensive on the surface of the growth lining the calyces. Very small areas of hemorrhages are found within the growth, but are more extensive over the surfaces. Places of scirrhus growth remind one immediately of breast carcinoma (Fig. 7). Numerous vessels were found containing tumor thrombi. These consist of active and irregular tumor cells, partly adherent to the wall. These cells must have been washed into the blood stream all the time. In spite of this no metastasis has occurred. For the fact, that the distant tissues did not take the graft, the explanation is found in the immunity of various tissues towards the cancer cells. When the capacity of the various resisting tissues to destroy the malignant cells disappears, in other words, when the immunity of the distant tissues is broken down, metastasis will occur. However malignant features the pelvic papilloma may show locally, even invading the blood circulation, it is unable to metastasize for quite a long time (Matsuoka, Hildebrand, etc.). There are two cellular factors that determine the occurrence of metastasis. (1) The degree of malignancy of the cells in the primary growth. (2) The relative immunity of the other tissue cells. A third factor will have to be sought for in the serological changes.

Considering the etiology of pelvic papilloma, Israel concludes from his case that stones play an important rôle in it. Although other cases of this kind are also reported, according to the literature, it is not common to find calculi associated with urinary tumors, especially with bladder papillomata, which again are so frequent. Chronic inflammatory process may often lead, however, to metaplasia, which in turn, with gradual hyperplasia, may result in a growth (Kischensky). Stoerk, in a careful histological study, reported a very interesting case of general papillomatosis of the entire urinary tract following a chronic inflammatory process of the same. Stoerk was the first to point out in this papilloma the importance of the vessel proliferation in the etiology of papilloma. Brutt made a very detailed study of the pathology of the "pyelitis villosa," in which, according to his conception, a rich proliferation of capillaries takes place first. This is characteristic for the regeneration associated with the chronic inflammatory process. Some of the capillaries grow towards the least resistance, perpendicularly upwards to the surface, and when these capillaries are subsequently covered by the epithelium, according to Brutt, the first stage of papilloma formation has taken place.

Beneke and Namba reported a case of carcinomatous papilloma with marked diffuse infiltration in the kidney tissue, which is particularly interesting from the standpoint of etiology. At the first operation this kidney showed a pyelitis, which followed trauma that occurred eight months before. There was no evidence of a growth at this time. A second operation, eleven months after the trauma, revealed a definite kidney tumor. The patient died six weeks after the second operation with generalized metastasis. Micro-

scopical studies of this case showed a medullary carcinoma, originated from the pelvic papilloma. On the other hand, we know that inflammation always initiates stone formation. Therefore it is a mere coincidence to find both stones and tumor in the same case without a causative relation to each other. Israel was the first to attribute primary importance to stones in the etiology of renal papilloma. The malignant invasion is probably responsible for the production of the marked perinephritic reaction in our case. The extensive fibrolipomatosis, especially at the lower end of the kidney, was the result of this inflammatory protective reaction.

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## HERNIA OF THE BLADDER\*

BY JAMES NORMENT BAKER, M.D.

OF MONTGOMERY, ALABAMA

THE following case of bladder herniation, complicating an acute intestinal strangulation at the inguinal opening, has served as a stimulus in the preparation of this study of bladder herniæ.

G. T., male, aged seventy-three, laborer. On the morning of January 11, 1921, arose and went to work as usual; about 9 A.M. was suddenly seized with abdominal cramps, soon followed by nausea and vomiting; he was sent to his home and was first seen by me about noon of same day. A cursory examination of the abdomen was made which revealed a rather large irreducible hernial mass in the right inguinal region, which, according to the patient's statement, had existed for more than twenty years and which, during the past four or five years, could never be completely reduced by himself, as had been formerly the case. The diagnosis—that of a strangulated hernia—being self-evident, he was sent at once to the hospital for operation. Owing to his age and the condition which had to be met—for the writer is strongly of the opinion that practically all strangulated herniae should be operated under local anaesthesia—novocaine infiltration anaesthesia was employed.

The usual hernial incision was made and the underlying tissues cautiously dissected down to the sac, which, on being opened, revealed a coil of small intestine tightly constricted near the deep abdominal ring. Upon release of this constriction, the viability of the gut became apparent and the segment was returned to the abdominal cavity. Attention was next turned to a dissection of the sac and the completion of a radical operation for the cure of the hernia. The dissection was begun from above and carried downward; at this stage of the operation the patient experienced considerable pain from the manipulations necessary to the separation of the large hernial sac, and the scissors were freely used in order to minimize the pain and trauma. The long standing of the hernia and the wearing of an ill-fitting truss had completely obliterated normal anatomical landmarks. Ere the operator was fully aware of what had transpired, a fair-sized cavity had been opened into, from which straw-colored fluid exuded. Further exploration revealed the dome of the bladder below and to the inner side, while a considerable pouch from the bladder—whose walls were markedly thinned out and forming almost a diverticulum—extended some two inches into the inguinal canal and constituted a part of the posterior inner wall of the hernial sac.

This herniated, diverticulum-like portion of the bladder was resected and the vesical opening closed with a double row of chromic catgut

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\* Read before Southern Surgical Association, December 15, 1921.

sutures. The dissection of the sac was then completed and the Bassini type of closure used to complete the operation. A cigarette drain was inserted through the lower angle of the wound down to the bladder incision; this was removed at the end of forty-eight hours, as no leakage of urine had taken place.

The post-operative behavior of this patient was quite uneventful; the wound healed by first intention throughout and he was discharged from the hospital at the end of two weeks.

Further inquiry into his past history revealed the significant fact that he had had, for several years, much difficulty in voiding, together with increased frequency, more especially by night. The prostate showed a moderate, though not marked, hypertrophy; no cystoscopic studies were made.

When last seen, some three months after the operation, marked improvement had taken place in the vesical symptoms.

Actual hernia of the bladder, while not commonplace, is by no means a surgical curiosity. If one accepts the classification of Brünner and of Eggenberger, of dividing bladder herniae into two groups, those which are manifest and those which are latent, we have a condition which is by no means rare and one which every surgeon, whose hernial work is at all extensive, has likely encountered more than once.

Karewski made extensive experiments upon the cadaver and demonstrated that there is a close connection between the hernial opening and the bladder coverings in persons of all ages without displacement of the bladder or lipoma and without any abnormalities of the organ. Even slight traction, as in high ligation of the hernial sac, without previous careful dissection of the peritoneum and prevesical fat, may produce a bulging of the bladder wall sufficient to cause this to be incorporated within the grasp of the ligature and subsequent vesical fistula result. This is particularly true in large hernial openings, in old ruptures, in herniae of the direct type and in recurrence of hernia after operation.

As to the frequency of bladder hernia quite a divergence of opinion exists. Brünner found, in a collection of 1841 operations for various types of hernia, sixteen which were complicated with cystocele, or a little less than one per cent. Eggenberger's statistics show seventy-five cystoceles in 6778 operations, or one and one-tenth per cent. Lucas Championnière reported six in 900 operations, or seven-tenths per cent. Coley, in his large experience, has encountered fourteen cases (1909).

As regards age and sex, Eggenberger's table shows 241 cystoceles, 168 being in the male and seventy-three in the female; no cases of bladder hernia have been observed at the age of puberty. In men, these herniae occur most frequently between fifty and sixty years of age; in women, between thirty and forty years. Brennisen gives the proportion of male to female cases as

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three to one; Eggenberger as three to two, and in Coley's personal experience the ratio has been seven to one.

Of thirty-eight cases of bladder hernia in the female reported by Eggenberger, fifteen were inguinal and twenty-three femoral; of the inguinal, ten were on the right side, four on the left side and one uncertain; of the femoral, ten were on the right side, ten on the left, one double and two uncertain.

Eggenberger states that the majority of bladder herniae are, in fact, false herniae, as they either have no peritoneal sac at all, or the bladder is found *alongside* the hernial sac instead of *within* the sac. According, therefore, to the manner in which the peritoneum is involved in these bladder herniae, he differentiates three varieties, viz.: (a) Extra-peritoneal; (b) para-peritoneal; (c) intra-peritoneal, or true bladder hernia.

Classification (b)—the para-peritoneal type—represents by far the most common variety, and of these he reports seventy-three cases; forty-three external, eight internal inguinal, twenty-one femoral and one perineal. The case reported above falls into this group. In this type of bladder hernia, that portion of the viscus which has peritoneal covering, is continuous with the posterior and inner portion of the true hernial sac; indeed, in some cases, it really forms this portion of the sac, a dissection of which, without injury to the bladder, becoming an exceedingly difficult, if not impossible, task. The important point in such a dilemma is to recognize the presence of the bladder before its penetration and to trim the peritoneal attachments of the sac from this organ.

Of type (c)—the intra-peritoneal or true bladder hernia—Eggenberger was able to find but one case reported in ten years. Brünner's statistics show five such cases.

As regards the genesis of bladder hernia, both Eggenberger and Sonnenberg are inclined to consider pathologic conditions within the bladder and pelvis, such as prostatic hypertrophy, stricture and gravidity, as important contributing factors. Hyperplasia of the fatty layers, because of its frequent prominence in many of the cited cases of vesical hernia, has often been considered as a probable contributing etiologic factor. Monod and Delagénieré, as well as Lotheissen, consider this a constant phenomenon in bladder hernia. In fifty per cent. of Eggenberger's reported cases, especial mention is made of an unusually large amount of fat or a lipoma. Yet, the position as to just why this condition, even though a frequent finding at operation, should be viewed as an etiologic factor, has not been logically defended.

The incidence of bladder hernia is much greater in the male than in the female by reason of the fact that the para-peritoneal type is the one most frequently encountered and this type is almost always accompanied by an inguinal hernia to which the male is exceptionally prone. No case of con-

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genital bladder hernia has been reported, the youngest case being eighteen months of age.

The preoperative diagnosis of bladder herniation, judging from published statistics, is made with chagrinning infrequency. That the very small, latent and symptomless type should go unrecognized, prior to operation, is not to be wondered at; yet, even at operation, we may often fail in recognition of the true condition. According to Alessandri's table of 223 reported cases, the diagnosis was made eighteen times without being confirmed by operation or post-mortem examination; twenty-five times a vesical hernia was found on autopsy; in but five cases was the condition recognized before operation, in 147 during operation and in the last series, the bladder remained intact in only eleven instances.

Bladder herniae of even moderate size and duration rarely fail to give rise to vesical symptoms. Sometimes the bladder may be emptied in two stages; in the first, the bladder itself is emptied; in the second, the herniated portion; or, again the urine may be voided in dribblets, much like that of the confirmed prostatic. The case herein reported presented, for several years, increased difficulty in completely voiding, as well as a globular mass in the inguinal region which was never completely reducible. These suggestive facts, owing to the urgency of the strangulation, were not ascertained, however, until after the operation. Many, if not actually incarcerated, are not completely reducible, and even after the concomitant intestinal or omental hernia has been reduced, there yet remains a small, slightly oval, doughy tumor. Should the bladder be distended with fluid, the size and shape of this tumor may be made to change and fluctuation elicited. In a suspected case the cystoscope should always be used and the relation of the displacement to the location of the hernia established.

During operation, one or more unusual conditions may present, any one of which should arouse suspicion.

(a) The first and most important is the presence of an unusual amount of extraperitoneal fat in the inguinal canal; this should be liberated and not included in the ligature encircling the neck of the sac. Coley, in his unusually large operative experience, by observing this rule, has never done violence to the bladder.

(b) The hernial opening may be, and usually is, of very large size and out of proportion to the amount of herniated intestine or omentum.

(c) The presenting hernia is most often of the direct type.

(d) Much difficulty may be encountered in separating the hernial sac, more especially the inner posterior portion, from which, if the bladder be involved, free bleeding is likely to ensue.

(e) Identification of the bladder musculature, which, if normal, may readily be done; if thinned out and attenuated as is frequently the case, identification is made difficult and the similarity to that of a hernial sac correspondingly increased.

Bladder herniae are, as a rule, irreducible; reverting again to Eggenberger's

## HERNIA OF THE BLADDER

compiled statistics, we find that out of 110 cases only nineteen were reducible, ten partially reducible, thirty-three irreducible, sixteen incarcerated, and concerning the remaining thirty-two no accurate data are given. Practically all inguinal herniæ of the bladder are associated with either intestinal or omental herniæ, and if the operation is an emergency one for the relief of an acute strangulation and if the herniated bladder be incarcerated, injury to this organ is almost sure to occur. No serious harm should result even though the bladder be wounded, provided the mishap is promptly recognized and properly corrected. The most serious trouble has arisen from unrecognized injury to the smaller bladder herniæ from either the inclusion of the bladder wall within the ligature placed about the sac or else from actual damage done the bladder wall during the sac dissection, without proper repair. Here the mortality has run from thirty to forty per cent.

### PRACTICAL DEDUCTIONS

The possibility of bladder involvement should always be suspected and due caution observed:

- (a) In all large inguinal herniæ, more especially those of advanced life and in those manifesting prostatic hypertrophy or other signs of crippled bladder function.
- (b) In all direct inguinal herniæ, regardless of size or age.
- (c) In all operations for recurrence of hernia, for two reasons:
  1. Recurrences are notoriously of the direct type.
  2. Adhesions and distortions of the neck of the sac from the former operation, resulting in a possible pull on, and displacement of, the bladder.
- (d) In all herniæ, presenting an undue amount of fatty tissue closely associated with the sac at or near the fovea inguinalis medialis, the possibility of injury to the bladder is increased and this danger signal should never go unheeded.

## GAS CYSTS OF THE INTESTINES

BY JACOB LOUIS BUBIS, M.D.

AND

CARL EMIL SWANBECK, M.D.

OF CLEVELAND, OHIO

FROM THE SURGICAL AND PATHOLOGICAL DEPARTMENTS, MT. SINAI HOSPITAL

*Synonyms:* This condition is also known as pneumatosis, cystic pneumatosis, pneumatosis, cystoides intestinis hominis, emphysema of the bowel.

*Occurrence:* That this disease occurs in apparently healthy pigs has been known since the beginning of the nineteenth century, but it was first observed in the human body by Colquet and Duverney in 1825.<sup>1</sup> Middle-aged males appear to be the most susceptible, although Tuffier<sup>2</sup> and Letulle<sup>3</sup> report a case of a girl twenty-three years of age. Weil<sup>4</sup> has found reports of only seventy cases of gas cysts of the intestines.

*Etiology:* Pneumatosis is due to the presence of gas in one or more coats of the intestines. The mechanism of its occurrence is still uncertain and the following theories have been advanced:

1. That the gas is secreted by the process of putrefaction of certain cells. Karsner,<sup>5</sup> however, states that if this were the case, many bacteria would be demonstrated in the presence of some necrosis. Most authors have been unable to find any bacteria. Koskow<sup>6</sup> stated that the giant cells show no vacuolization and appear in areas at some distance from the larger cysts. There are no giant cells in the gas glands of the swim bladder of the fish.

2. That the gas is liberated from the tissue lymphatics. There has been no definite proof of this assumption.

3. Bacterial origin: As above stated, bacteria and inflammation with round-cell infiltration are seldom found, although Letulle thinks that organisms from the intestinal tube invade large lymph-channels, causing cysts by gas production.

Nitch<sup>7</sup> believes that there is an infection of the wall of the cæcum with gas-producing bacilli, notwithstanding the failure to find any organisms in either the cells or exudate. In his case, the histological picture resembled an infectious process which involved the submucosa and the muscularis.

The following bacteria have been found by various authors: *Bacterium coli lymphaticum aerogenes*, *B. aerogenes*, *B. cedematous malignum*, *B. cedematus*, *B. coli*.

4. Neoplastic Theory: Two facts that refute this theory are first, that cysts are not frequently found accompanying cancer, and second, there is a spontaneous disappearance of the cysts followed by cicatrization in most cases.

5. Mechanical Theory: This is the most plausible or, at least, the most

## GAS CYSTS OF THE INTESTINES

common cause. The mechanism as explained by Karsner is as follows: Pressure, caused by peristaltic action, on a column of gas in the intestines will force the gas through paths of least resistance, *i.e.*, through tissue spaces (especially if there is a break in the lining surface) and through the lymph-channels. Such lesions are frequently very small and therefore are easily overlooked. Tuberculosis, appendicitis, atrophic changes, etc., are causes of these breaks in the intestinal walls. Sudden increase in the intra-intestinal gas pressure may force gas and bacteria through the above defects into the layers of the intestinal wall.

The composition of the gas as analyzed by Tuffier and Letulle is  $\text{CO}_2$  15 per cent., O, 5.6 per cent., H, 73.3 per cent., N, 6.1 per cent. Letulle also stated that the gas is odorless and burns with a blue flame. Nigrisoli<sup>9</sup> and Grvendhal<sup>10</sup> did not find the gas inflammable. Hey<sup>11</sup> states that O<sub>2</sub> plus N<sub>2</sub>O were found in one case, CO<sub>2</sub> in three cases and H in one case.

Associated conditions present were: Thirty-two cases had ulcer of the stomach or pylorus; four cases showed tuberculosis of the bowels; two cases complicated tuberculosis of the lungs; two cases complicated appendicitis; two cases complicated chronic enteritis.

Tuberculous peritonitis, pyloric cancer, pernicious anaemia, uræmia, myocardial insufficiency were each concomitant with pneumatosis. Weil's cases had no associated lesion but the patient had had a mild attack of typhoid three years previous.

The case reported below had a definite ulcer at the base of the appendix.

A. F., male, thirty-three years of age, laborer, was first examined by me June 23, 1920. He complained of weakness, general malaise, pain in the right side of the abdomen radiating to the right testicle, and epigastric distress. There was no history of nausea or vomiting, but he was unable to eat much at one time. He had urinary frequency, two or three times at night, unaccompanied by burning or haematuria. There was a slight tendency to diarrhoea, and he lost fifteen pounds in four months. There was no history of any venereal disease, cough, night sweats or chills. The patient called attention to a mass in the lower right abdomen. The present complaint dated back three months. The past history was negative except that his tonsils had been removed about one week previous in the hope of relieving him of some vague pains in his joints and to improve his digestion.

Physical examination was negative except for some bad teeth and a slight icterus of the conjunctivæ.

The Wassermann and urinary tests were negative. Temperature and pulse were normal. The blood count showed 9000 W. B. C. and the blood coagulation time was 3.5 minutes.

Abdominal examination showed a sausage-shaped boggy tumor mass in the right lower quadrant of the abdomen, 10 cm. long and about 7.5 cm. wide. This was tender, very freely movable, especially upward toward the costal border. Deep pressure on this mass suggested a fecal impaction. No free fluid was demonstrated. The diagnosis

rested between fecal impaction, incomplete intussusception, tumor of the cæcum, or of the appendix. Unfortunately, no X-ray examinations were made. The patient was operated June 24, 1921. The anæsthetic consisted of  $N_2O$  plus O and local infiltration of 1-400 solution of apothesin. A four-inch right rectus incision was made over the mass. Upon opening the peritoneum the tumor was found to consist of a thickened, œdematosus, spastic, contracted cæcum and ascending colon. The appendix seemed thickened and the outer gut, from the ileo-œœcal valve to the hepatic flexure, was congested but free from adhesions. The most peculiar condition present was the doughy, crepitant feel of the mass and the appearance of minute, raised, pearly-like gas cysts under the serosa, some of which were discrete and others confluent. Pressure on the bowel caused the air bubbles to change their location very readily.

The operation consisted of the removal of the appendix, cæcum and ascending colon "en masse" with the cautery and in uniting the healthy ileum to the unaffected transverse colon by a lateral enterocolostomy. A small drain was inserted, and removed on the third day following. The patient made an uneventful recovery and left the hospital two weeks after the operation. Two months later he was feeling well, eating regular meals, and had regained his lost weight and strength.

**Surgical Pathology:** The specimen consisted of the ascending colon and cæcum with the appendix still attached. The mass was boggy and crepitant on palpation. On section the walls of the gut were found to be much thickened and filled with small air-containing cysts. These extended into all coats of the specimen, especially the mucosa and submucosa. The mucosa appeared intact throughout except near the base of the appendix, where there was a small indurated erosion. Pressure on the cæcum caused air bubbles to appear here. The serosa was shiny and numerous air vesicles could be seen throughout it.

**Histological Pathology:** The section was taken near the ulcer at the base of the appendix. This showed numerous cysts lined by endothelium. There was a marked œdema and a large number of giant cells were seen. Slight increase in fibrous tissue was noted, but nothing was found to indicate that the process was chronic. There was also an absence of pus cells.

The cystic areas extended from the mucosa down to the muscularis and occasionally to the serosa. Many of the cysts were round and adjacent to blood-vessels. In some places the fibrous tissue was spread apart and filled with air. No bacteria were seen in any of the sections studied, neither was there any inflammatory reaction except near the ulcerated area.

The following explanation as to the presence of the gas cysts in the walls of the bowel seemed to be the most plausible: The ulceration seen at the base of the appendix was undoubtedly the portal of entrance for the gas in the submucosa. The mechanical action of the intestinal peristalsis probably accounted for the ascent of the gas up the walls of the gut. The ulcer at the base of the appendix was possibly a



FIG. 1.—Dilated lymphatics forming so-called gas cysts. Completely lined by endothelial cells. Lower power.

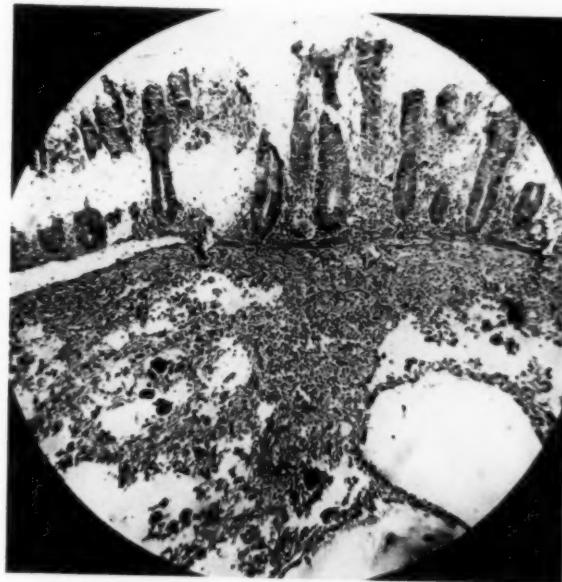


FIG. 2.—Dilated lymphatics giant cells. Lower power.

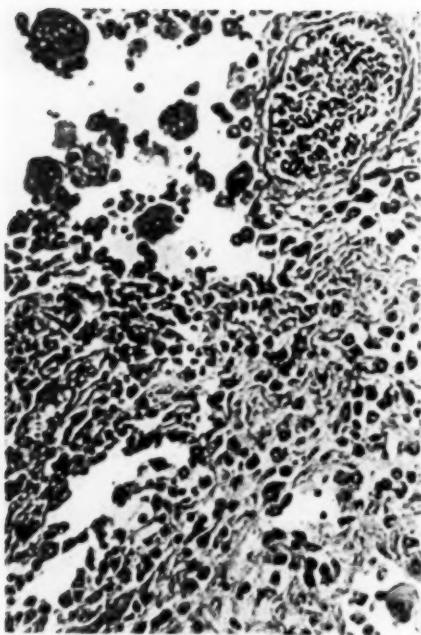


FIG. 3.—Numerous giant cells. High power.

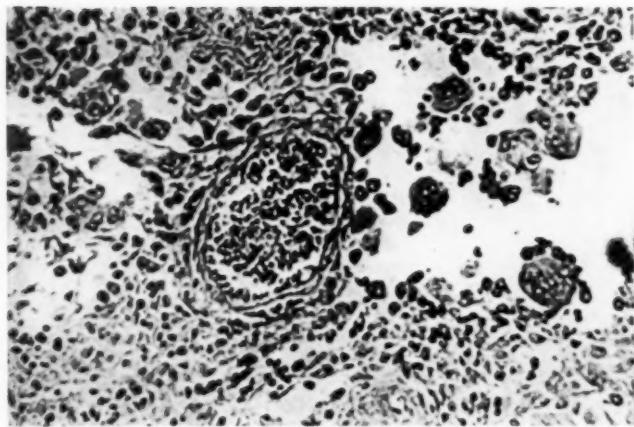


FIG. 4.—Numerous giant cells. High power.

## GAS CYSTS OF THE INTESTINES

chronic one as there is considerable fibrosis and infiltration of lymphocytes about it. The entrance of the gas was evidently of recent origin, as very little inflammatory reaction to the gas was seen.

**Diagnosis:** Subacute appendicitis; ulcer at the base of the appendix; gas cysts of the cæcum and ascending colon of mechanical origin.

**Pathology of Gas Cysts:** Upon opening the peritoneal cavity, the intestines, stomach,<sup>12</sup> gastro-hepatic ligament,<sup>13</sup> omentum and epiploica may be covered with grayish white, transparent gas cysts varying in size from a pinpoint to the size of a fist.<sup>14</sup> They may be discrete or confluent, pedunculated or sessile, or they may take the form of a bunch of grapes. Some of the cysts may be filled with a purple fluid.<sup>12</sup>

The bowel is thickened, boggy and crepitant to touch like lung tissue or a sponge. There may or may not be some inflammatory reaction present, depending on the cause and the length of time these cysts have been present.

Obstruction of the lumen of the bowel is due to the oedema and swelling of the intestinal coats.

**Symptoms:** The symptoms of this condition may suggest appendicitis, peritonitis, ileus or a tumor. Notwithstanding extreme distention, the abdomen may be soft and compressible, elastic and resonant to percussion.<sup>4</sup> Flatulence and recurrent indigestion, pain one or two hours after eating, which is severe at times, and relieved by vomiting, and other symptoms of pyloric or gastric ulcer, such as loss of weight and strength,<sup>7</sup> may be present. Again, there may be obscure abdominal symptoms referred to the right side, or there may be sudden sharp, colicky pain without vomiting.

Case I by Tuffier and Letulle showed intermittent distention which became permanent, accompanied by vomiting and diarrhoea.

Case II complained of gastric symptoms, abdominal heaviness, change in the shape of the abdomen and frequent vomiting. My patient complained of pains and distress in the abdomen, the inability to eat a full meal, loss of weight and ambition, pain referred from the right sacro-iliac joint to the right testicle, frequent micturition (although urine test were negative), and the presence of the mass in the lower right abdomen. Several weeks after the operation these disturbances disappeared.

**Treatment:** An exploratory laparotomy is indicated, providing the patient's condition is favorable or when improvement under medical attention warrants it. Weil states that the therapeutic effects of even an exploratory operation are remarkable.

Five writers report the complete disappearance of the cysts after the above operation. Von Hacker advises either puncturing the cysts or leaving them alone. Tuffier made an exploratory operation on his case. The patient died from intestinal obstruction. At autopsy no cysts were found. Kadjian's<sup>15</sup> patient died from recurrence after he had done three laparotomies and excisions. Undoubtedly he did not remove the cause.

Resection or short-circuiting the affected area, with the removal of the possible source, seems to be the most advisable form of treatment, especially in the presence of stenosis of the bowel. This treatment gave the desired result in the case reported above.

## CONCLUSION

1. An ulcer at the base of the appendix was undoubtedly the portal through which the gas entered the layers of the cæcum and the ascending colon in the case above reported.
2. Whether or not the infection was secondary to tonsillar infection should be given due consideration.
3. Treatment consists in the removal of the cause if possible, although simple exploratory laparotomies have caused complete cures. Resection or short-circuiting of the afflicted area, with the removal of the primary focus, seems to give best results.

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- <sup>10</sup> Grvendhal: Quoted by Letulle. *Ibid.*
- <sup>11</sup> Hey. *Deutsch. Ztschr. f. Chir.*, cliv, p. 250, 1920.
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## TRAUMATIC DIAPHRAGMATIC HERNIA

BY C. B. KEENAN, M.D.

OF MONTREAL, CANADA

ROYAL VICTORIA HOSPITAL

THE above condition was brought to the attention of surgeons quite forcibly during the late war, as occasionally a missile traversed the left chest and upper abdomen without producing any lesion requiring surgical intervention, save that of a wound of the diaphragm, with resulting diaphragmatic hernia. These cases came to be recognized from the position of the wound being such as might produce this injury, and from the symptoms, which were those of a left-sided pneumothorax, associated with those of a localized peritonitis in the left upper quadrant of the abdomen. The majority of these cases underwent immediate operation, usually with excellent results, but occasionally such a case escaped immediate attention, possibly because the wound of the diaphragm was small and the hernia of the stomach did not develop for some time.

Our first case was a patient aged thirty-two years who had suffered a bullet wound of the chest, in June, 1916, with the entrance at the left ninth rib posteriorly, and the exit at the seventh rib in the mid-axillary line of the same side. After a short stay in the Military Hospital, he was discharged free from symptoms, and remained so until August, 1917, when he commenced to suffer from attacks of severe pain in the epigastrum and at the left costal margin, coming on chiefly after meals. These attacks persisted, becoming more severe, and in 1919, they commenced to be associated with vomiting, which relieved the pain of this attack. Such was his condition when first seen by me in November, 1920. Examination showed the usually accepted signs of a pneumothorax at the left base and the X-ray photograph showed that a large part of the stomach lay above the diaphragm, in other words, he had a diaphragmatic hernia. (Figs. 1 and 2.)

On November 25, 1920, an operation for the radical cure of this was performed, the chest cavity being opened by removing about six inches of the eighth rib, in the posterior-lateral region, cutting the pleura, and then gently separating the adherent lung from the diaphragm and from the hernial sac which had formed, and which was filled by a large portion of the stomach. This sac was opened, and the stomach easily reduced into the abdominal cavity. Then the edges of the tear in the diaphragm, which formed a round hole about 3 inches in diameter were sutured, overlapping as much as possible. The chest wall was then closed in an air-tight manner, and the patient made an uneventful recovery and left the hospital in three weeks, free from all stomach symptoms, remaining so till the present time his diaphragm being intact. (Figs. 3 and 4.)

The second of these cases occurred in civil practice, and was easily recognized from the experience in military surgery.

The patient, a man aged forty-eight years, was admitted to my care in the Royal Victoria Hospital, on September 24, 1921, complaining of severe pain in the epigastrum, which was immediately and greatly increased by swallowing even

### C. B. KEENAN

a little water. He also had nausea and occasional vomiting, which did not relieve his pain, hiccough, shortness of breath, and pain in the left lower chest on breathing. He stated that about twenty hours previously, he had been struck on the upper part of his abdomen by an angry dehorned bull, and had escaped further injury by the blow knocking him through or over a fence. He immediately commenced to suffer from the above symptoms, which persisted until his entrance to the hospital.

Examination on entrance showed him to have a pulse of about 110, and a respiration rate of about twenty to the minute. There was marked rigidity in the left upper quadrant of the abdomen, with marked immobility of the left lower chest, and in this latter region, there was marked tympany on percussion, with a positive coin sound, both in front and back, up to the level of the fifth rib anteriorly. The apex beat was in the normal place. In other words, the general condition was that of moderate shock, and the local signs and symptoms suggested peritonitis in the left upper quadrant of the abdomen, associated with left-sided pneumothorax. The severe pain on swallowing also suggested stomach involvement; so, in face of an internist's suggestion of interlobar pneumothorax, a diagnosis of diaphragmatic hernia was made, which was later confirmed by X-ray examination. (Figs. 5 and 6.)

On September 25, 1921, under ordinary ether anaesthesia, the thorax was opened by removing the left eighth rib, disclosing a recent tear through the antero-lateral muscle of the diaphragm, about four inches long, with about one-half of the stomach protruding through this rent. There was also considerable free blood in the pleural cavity and an uninjured spleen also presented itself in the wound. The stomach was easily reduced into the peritoneal cavity, and the rent in the diaphragm was sutured, overlapping as much as possible, the effused blood was removed and the chest wall completely closed. The patient made an uneventful recovery and left the hospital in about two months, completely free from symptoms and with the hernia cured. (Figs. 7 and 8.)

Rupture of the diaphragm on the left side by severe blows on the abdomen occurs moderately frequently, and the best results are obtained by early diagnosis and immediate operation. The method of approach for the cure of the same may be through the chest as in the above, or through the abdomen. In the vast majority of cases the cure is much easier through the thoracic route, but I would advise, in future, in similar cases to the above that the incision be on the antero-lateral surface, extending partly into the thoracic cavity and partly into the abdomen, where excision of a rib would not be required, retraction alone being sufficient.

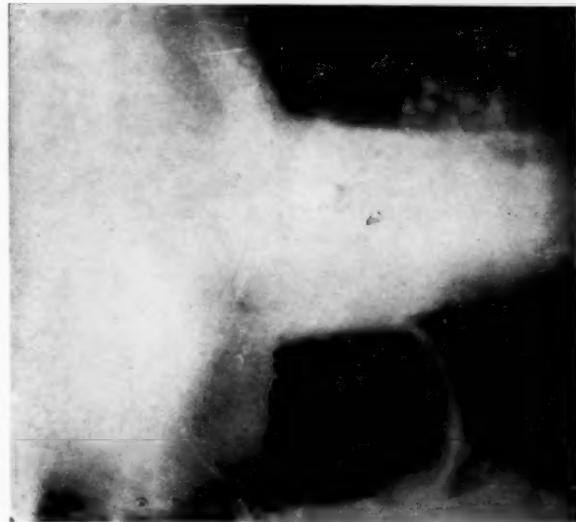


FIG. 1.—X-ray of lower chest with the patient standing, shows level of diaphragm on the right side and on the left side, fluid in the stomach at the same level, with the upper part of the stomach well distended with gas at a much higher level than the dia-

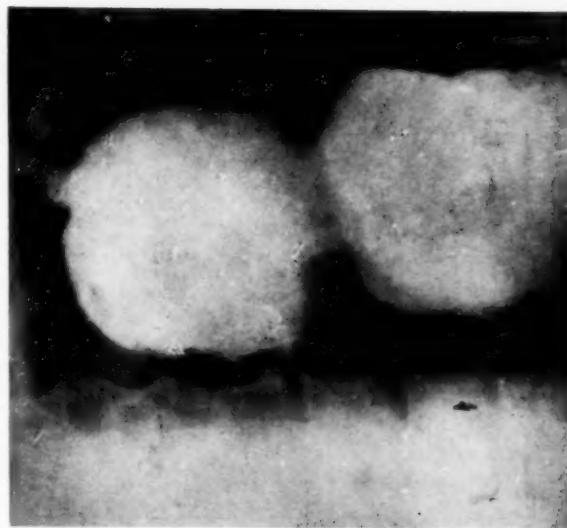


FIG. 2.—X-ray of stomach, after a large barium meal showing a marked constriction of the stomach due to the hernial orifice.



FIG. 4.—Stomach completely filled by barium meal.

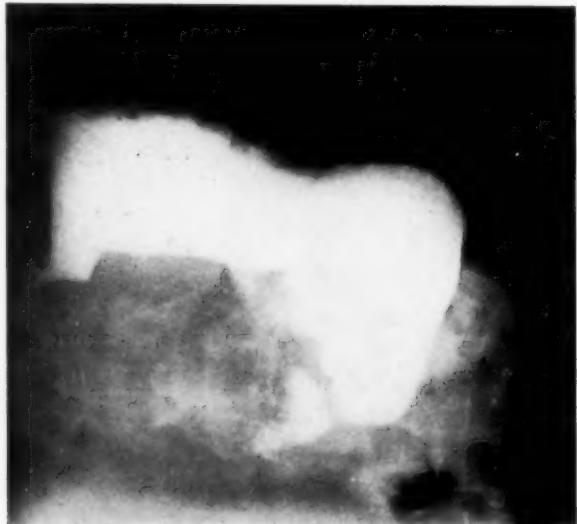


FIG. 3.—Partially filled stomach with fundus adherent to operation wound.

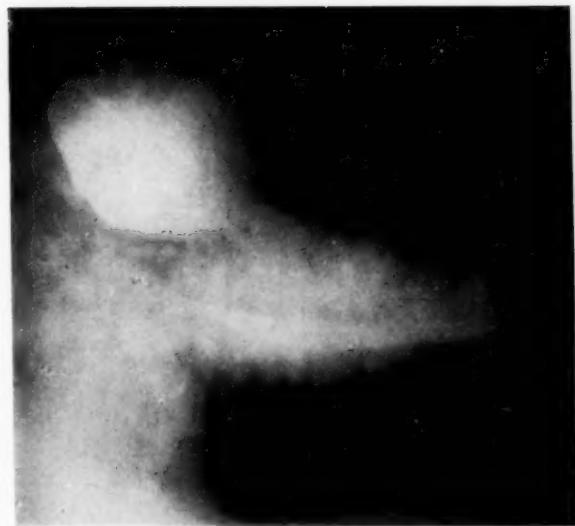


FIG. 5.—X-ray of lower chest, with patient sitting erect. Level of diaphragm well shown on right side. On the left, the stomach contains a little barium, but the fundus of the stomach, well distended with gas, is seen at a level much higher than that of the right diaphragm.



FIG. 6.—Stomach filled with barium meal, which appears in two parts, the smaller one being above the diaphragm, and the larger one being below.

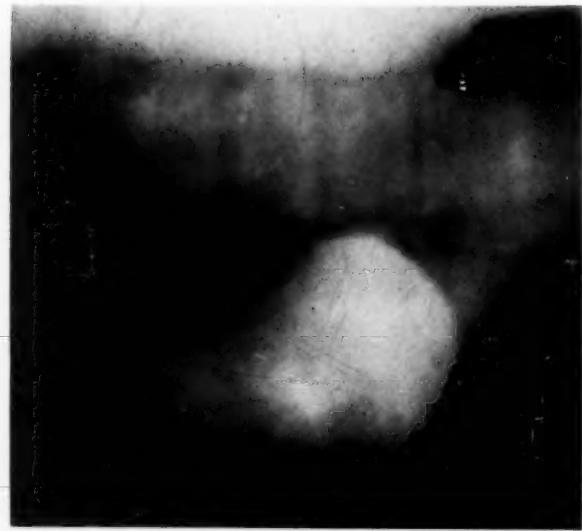


FIG. 8.—X-ray with barium meal showing the level of the diaphragm on the right side and the full stomach on the left, below the diaphragm.



FIG. 7.—X-ray showing the healed diaphragm somewhat caught up to the chest wall at the operation wound.

TRANSACTIONS  
OF THE  
NEW YORK SURGICAL SOCIETY

*Stated Meeting Held January 11, 1922*

The Vice President, DR. EUGENE H. POOL, in the Chair

STENOSIS OF GASTRO-ENTEROSTOMY STOMA

DR. RICHARD LEWISOHN presented a patient, fifty-three old, who had been operated by Dr. A. A. Berg, at Mount Sinai Hospital, for carcinoma of the pylorus six months previously. The operation consisted in partial gastrectomy and button gastro-enterostomy. The tumor proved to be an adeno-carcinoma.

The patient made an uneventful recovery and gained fifteen pounds in weight following the operation. The button passed a few weeks after the operation.

Four months after the operation the patient had recurrence of symptoms, consisting in nausea, vomiting and loss of weight. X-ray examination showed a very large twenty-four-hour residue in the stomach.

The question that arose was whether the condition was a recurrent carcinoma or was a stenosis of the stoma. A pre-operative diagnosis of stenosis of the stoma was made and the patient operated six weeks ago. The stoma had contracted to the size of a lead-pencil. No ulceration was present. The stoma was entered on its anterior aspect. The posterior wall was left intact and the opening widened to admit two fingers. No sign of any recurrence was found at the time of operation. The vomiting stopped immediately after the operation, the patient has gained in weight, and X-ray examination shows the stomach completely empty after three hours.

DOCTOR LEWISOHN stated that he reported four years ago two cases of stenosis of the stoma following resection of the stomach for carcinoma. Both patients were reoperated upon four months after the primary operation. The recurrent symptoms subsided completely after the secondary operation and the patients lived for nearly two years, after which they succumbed to a recurrent carcinoma. In one case the button was still *in situ*, at the time of the secondary operation. In the other case, as in the case just presented, the button had passed a few weeks after the operation.

No similar cases in which symptoms of recurrent gastric carcinoma were simulated by a stenosis of purely mechanical causes appear to have been reported in the literature. The possibility of a stenosis of the stoma should certainly be considered if patients complain of recurrence of symptoms a few months after resection of the stomach for carcinoma.

## NEW YORK SURGICAL SOCIETY

DR. HERMANN FISCHER inquired if the Murphy button was used, because, if so, there is a possibility that the button had something to do with the stenosis.

DOCTOR LEWISOHN replied that he felt that the very considerable objection to the Murphy button, which seems to have come into disrepute, was not justified and still used it in the vast majority of his gastric resections. If the button is used the resections can be extended very much farther. Following extensive gastric resections a suture gastro-enterostomy is often very difficult and the choice lies between a button gastro-enterostomy and the Polya-Balfour method of anastomosis. Before closing the gastric end one-half of a Murphy button is dropped into the remnant of the stomach; the other part of the button is inserted into the jejunum in typical fashion. A very small stab is then made into the posterior wall of the stomach. The gastric half of the button is pushed through this opening and stomach and jejunum are thus united. Among all the speaker's gastric resections, stenosis of the stoma occurred in only three cases. In two, the button passed a few weeks after the operation. It is of course possible that the button was the causative factor for the formation of the stenosis.

### MUSCULOSPIRAL NERVE REPAIR

DR. ROBERT T. MORRIS presented a young man twenty-five years of age who, on September 24, 1918, caught his arm in a rimming machine and suffered a comminuted fracture of the left humerus. He was operated on immediately at St. Vincent's Hospital, Staten Island.

The patient when seen on November 9, 1918, by the speaker, had a complete musculospiral paralysis. On November 28, Dr. William M. Leszynsky reported that he found some atrophy of the extensor group of muscles of the forearm, wasting quite pronounced circumferentially over the middle portion of the arm, an area of cutaneous hyperesthesia and incomplete analgesia over the dorsal surface of the thumb and index finger corresponding to the distribution of the radial branch of the musculospiral nerve. He found a paralysis of the muscles supplied by the musculospiral nerve and voluntary movements restricted to the biceps group and deltoid muscles. Radiographs taken eight weeks after the injury showed both transverse and longitudinal comminution of the shaft of the humerus.

On December 12, 1918, operation at Broad Street Hospital; excision of the large hand scar and exposure of the injured nerve area. The various fractures appeared to be progressing toward fibrous union. The musculospiral nerve was found to be practically absent for a distance of more than three inches; some crushed nerve elements remained mixed with scar tissue over this area. At the proximal end of the wound the musculospiral trunk appeared to be normal and at the distal end of the wound the branches of the musculospiral appeared to be undergoing degenerative change. Little if any nerve tissue could be recognized between these proximal and distal points. The nerve ends were bridged with silk thread for a distance of at least three inches following traces of some sheath. The freed trunk above was buried

## HEPATIC JEJUNAL ANASTOMOSIS

beneath a muscle flap of the deltoid. Primary union followed. The arm was placed in splints and later carried in a device developed by the patient.

No notable change took place until some sixteen months after the operation. At that time the patient while using his arm as a weight for holding woodwork which he was sawing began to feel a return of strength and of sensation in the injured arm. He has recently appeared at the office stating that his left arm is practically as good as his right, with complete return of musculospiral and other functions. He states that the only difference which he notes is that his left arm tires a little more quickly than the right arm.

## HEPATIC JEJUNAL ANASTOMOSIS FOR DESTRUCTION OF COMMON DUCT

DR. CHARLES L. GIBSON presented a patient thirty-five years old, who entered the New York Hospital, April 11, 1919, for relief of swelling below right costal margin of two weeks' duration. She has suffered from rather indefinite digestive disturbance for past two years. Otherwise, history is negative.

Examination shows mass, size of hen's egg, in right hypochondrium. Skin not involved. Mass seems to be situated in the abdominal wall. Somewhat tender to pressure.

Operation, April 12, 1919. Four-inch incision outside rectus muscle, opening into an abscess which leads into an old, adherent gall-bladder containing two calculi. Wound drained with rubber dam Mikulicz tampon.

Discharged from hospital two weeks later with a sinus discharging muco-pus. In that time several more gall-stones had been removed. To return for radical operation.

On October 11, 1919, laparotomy performed outside of right rectus, encircling gall-bladder sinus. Gall-bladder hardly recognizable owing to marked changes and anatomy of the ducts obscure. It was found on dissection that the upper layer or roof of the first part of the common duct up to its junction with the hepatic had either been stripped off or destroyed. Gall-bladder removed and operation to be described performed, preference being given to it rather than the other possibilities of drainage with the tube coming out into the duodenum or a "T" tube to be removed later, or an implantation into the stomach or duodenum. These were rejected because, while the primary results are often seemingly brilliant, the end results are for the most part very unsatisfactory owing to late cicatricial changes.

The hepatic duct, which was a little dilated, was divided at its junction with the common duct and a side-to-end anastomosis made with the upper portion of the jejunum which was loosely brought up over the colon. There was no special difficulty in performing this anastomosis. A precautionary drain of rubber dam was inserted to site of anastomosis.

The operation was well borne. Convalescence was satisfactory,

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patient being discharged in nineteen days. There was never any jaundice or any other disturbance.

Since leaving the hospital patient has been under observation and has made a marked gain in general health with entire relief of all former symptoms. She has also gained much weight.

DR. EUGENE H. POOL said that the two features which cause embarrassment in an operation for reconstruction of the bile duct are, first, the difficulty of finding the duct; second, what to do when it is found. The first difficulty can be avoided by lifting the anterior edge of the liver and following the inferior surface downward which leads one to the dilated sac or biliary reservoir, which is always present above the obstruction. Through an opening in this dilated hepatic duct a probe may be passed down, demonstrating where the stenosis is; dissecting along the probe readily exposes the stenosed portion and the duct lower down.

In a recent case Doctor Pool found a stricture one-quarter inch long just below the hepatic ducts. The case had been operated twice by another surgeon. Anastomosis to the stomach was decided upon and carried out by the following method. A probe was passed into the stomach through its anterior wall three inches from the pylorus and out the anterior wall near the lesser curvature close to the pylorus. The duct was cut across at the stricture and the stump of the duct was sutured to mucous membrane at the opening in the stomach. One end of a rubber tube was introduced into the reservoir of bile and fixed with suture. The other end of tube was then attached to probe and pulled through the stomach and out through the anterior wall. As the tube was drawn upon, the stomach was inverted with purse-string sutures over tube and the stump of duct, thus forming a tight gastro-biliary fistula. Some excess of tube was left in stomach so as not to be pulled upon when stomach dilated. The other gastric opening was inverted with purse strings. The idea in not making an opening in the portion of tube which passed through stomach was to prevent bile from immediately entering stomach and also to recognize if tube became obstructed. Unfortunately, there was also present a duodenal ulcer which was inverted apparently without causing obstruction. The tube was removed on the ninth day, up to which time the bile drainage was adequate and the patient's condition good.

Since reporting this case, Doctor Pool announces patient died as result of pyloric obstruction. As there was no autopsy, it is not known whether the anastomosis or operation for the duodenal ulcer was responsible.

### PLASTIC ON HAND

DOCTOR GIBSON also presented a patient, thirty-three years old, who was admitted to the New York Hospital, January 8, 1920, having injured his hand in a driving wheel. Palmar flap of skin and subcutaneous tissue and dorsal flap torn up from hand but attached to hand at base of fingers. Two small pieces of skin on the ulnar side of hand were missing

## TUMORS OF THE BREAST-BENIGN AND MALIGNANT

and a small piece of skin on radial side. Tendons and bones were intact.

On January 8, under ether anaesthesia, the flaps were lifted up and cleaned as far as possible. Several small vessels tied. Carrel tubes inserted. Hand put on splint.

Observations showed the flaps were not viable and they were eventually trimmed off.

On January 28, there being a good bed of firm granulations, under an anaesthetic the whole area was grafted with Thiersch grafts.

Discharged on February 9 with a good part of the wound closed by Thiersch grafts but some granulating area still remained, especially on the ulnar aspect.

Reentered May 21, 1920. Meanwhile had been treated by baking and massage, getting fairly good function in all but little finger. A persistent cicatricial band prevented flexion at metacarpophalangeal joint.

On May 22, under ether anaesthesia, the defective cicatrix on the ulnar aspect, which bound down the little finger, was excised. The extensor tendons were liberated, allowing of flexion after forcible manipulation of the metacarpophalangeal joint. To prevent the return of the cicatricial condition, a flap was raised from the central portion of the abdomen and its free edge sewn to the upper free edge of loss of tissue on ulnar side of the hand.

Part of this flap was cut away under local anaesthesia on June 2.

The remainder of the flap was cut away on June 8 under ether anaesthesia. It bled freely. Deep surface of tendons exposed and fat inserted. The metacarpophalangeal joint was again forcibly flexed. Suture of flap to remaining surface of hand.

Discharged on June 18. Wound has healed well and there was already some improvement in function of little finger.

On September 27, 1920, considerable improvement in function of hand but still limitation at metacarpophalangeal joint. Attempt to mobilize this under gas gave no result.

March 21, 1921. All functions of hand are established except motion of metacarpophalangeal joint of little finger. Phalanx evidently dislocated into palm, not allowing little finger to close. Offered to resect joint but patient did not wish to lay up. He has now entirely resumed his former occupation.

## TUMORS OF THE BREAST, BENIGN AND MALIGNANT

DR. CHARLES H. PECK and DR. W. C. WHITE (by invitation) read a paper with the above title.

In discussing this paper Dr. Charles N. Dowd referred to the increased proportion of the known malignant tumors of the breast which come to the attention of a surgeon. General instruction in the cancer problem had brought the subject more prominently before the public and many patients now consult the surgeon for these conditions who previously would not have done so. Without doubt the cases who really have malignant growths are coming for treatment earlier than formerly.

One form of benign swelling is worthy of increased attention, and one does not often see reference to it in the literature. This is the simple pyogenic

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inflammation in a non-lactating breast, usually forming about some ducts which have apparently been clogged. These abscesses are not common but they nevertheless are seen in sufficient number to be a definite factor.

In these days when there is so marked a tendency to turn to other forms of treatment for cancer, it is well to again emphasize the results which are obtained by routine operation. A cure may be expected in from twenty-five to fifty per cent. of the cases as they come to the surgeon at the present time; this is a better percentage of cure, in all probability, than can be obtained by any other method. This estimate is based on five years of post-operative observation. There seems to be a need at the present time of keeping before the public mind the fact that surgery offers more than any other form of treatment for these patients.

DR. ALLEN O. WHIPPLE asked Doctor Peck what his views were regarding radium or X-ray therapy before and after the radical operation in these cases of breast tumor.

DR. ALEXIS V. MOSCHCOWITZ remarked that in his personal experience he had never seen a benign tumor of the breast degenerate into a malignant one. He did not deny its possibility, however. The text-books lay considerable stress upon this point and frequently advise a more radical procedure than he was accustomed to do. He was inclined to believe that this view was needlessly exaggerated. He had not found that a bloody discharge from the nipple was a sign of malignancy. On the contrary, it has been his experience that such bleeding was usually caused by a small, perfectly benign papilloma in one of the major excretory ducts of the breast. The extirpation of this duct with local excision of that part of the breast drained by it usually sufficed for a cure.

He felt that occasionally surgeons went too far with the extirpation of the cutaneous covering of the breast. This opinion being based upon the fact that up to four months ago, when the speaker saw two such cases, he never experienced a local cutaneous recurrence, nor for that matter any local recurrence, and certainly never in those cases in which he was satisfied at the termination of the operation that the procedure had been truly radical. This, of course, did not exclude distant metastases, for he looked upon these, without any local recurrence, as proof of the fact that these metastases were already present in an undiscoverable stage at the time of the operation.

He had been accustomed for about fifteen years to dress cases of breast amputation with the arm abducted at a right angle. The patients were very uncomfortable for the first four or five days, *i.e.*, until the first dressing, but since he had begun doing this he had never seen the rather distressing lymphedema of the arm, and had found that the patient regained function of the arm very promptly.

DR. EDWIN BEER considered that among the very interesting points brought out by Doctor Peck's paper, there was one which seemed of very great importance as exemplified by the series of eleven cases in which a primary incision was made into the breast tumor for diagnosis, and days

## TUMORS OF THE BREAST-BENIGN AND MALIGNANT

and even weeks elapsed before the secondary or radical operation. The fact that a number of these cases were cured by the secondary operation was, in a measure, an unfortunate result, because, contrary to the experience of others in which delayed radical operation had not led to a cure, Doctor Peck's series might lead surgeons in the future to delay the second or radical operation until they obtain a definite pathological diagnosis of carcinoma from the specimen removed at the first operation. This would surely be unfortunate in view of the general experience that delay in doing the radical operation so regularly diminishes the patient's chance of a permanent cure. The proper procedure would be to let a radical operation immediately follow the diagnostic exploratory incision.

DR. BURTON J. LEE commented on the comparative frequency, according to Doctor Peck's paper, of the occurrence of carcinoma in non-lactating breasts. In the cases of breast cancer at the Memorial Hospital the speaker had found that approximately one-third of the patients had non-lactating breasts. This fact suggested to him the possibility that carcinoma of the breast may be in some way associated with an interference with normal development of the mammary gland.

As to the question of operability or inoperability, Doctor Lee wanted to know what the feeling was in the society with regard to the proper treatment of a case of breast cancer in the presence of involved supraclavicular nodes. He himself had felt that definite involvement of these nodes should be sufficient to place the case in the inoperable class, and he therefore withheld operation in these cases, relying upon radiation alone.

Having seen a considerable number of Doctor Peck's cases which were referred to the breast clinic at the Memorial Hospital for post-operative radiation, Doctor Lee had been impressed with the excellent arm function obtained.

DR. FRANK S. MATHEWS said that his personal experience had led him to think that carcinoma was more likely to affect breasts that have been the seat of diseases of benign type. He rarely resorts to skin graft but, following the work of Sampson Handley, had practiced extensive subcutaneous dissection. Looking over the records of his own cases recently he found the percentage of apparent cures about the same as those reported by Doctor Peck. Referring to the previous discussion regarding the dangers of removing a nodule for examination preliminary to complete operation, the speaker liked to avoid this method when possible. In one of his own cases, however, a doctor had made a local incision and removed a cancerous nodule and had gone through the cancer tissue. Doctor Mathews operated a month later and the patient lived five years and died of an acute abdominal illness. He found it advantageous always to remove the pectoral muscle and dissect the axilla from above downward.

DR. GEORGE H. SEMKEN noted that recurrences appeared in remote tissues or in the neighborhood of the field of operation. Of the remote recurrences, many are probably the result of the handling of the primary

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tumor, either by the patient or by various physicians. Tyzzer has shown in mice how much earlier and more frequently metastases appear when the tumors have been handled than when they have been left undisturbed. The examination of such patients, therefore, becomes a matter of great importance. If the patient lies supine, so that the breast flattens out upon the chest wall, it is possible to detect gross lesions by light pressure of the flat hand upon the breast against the rigid chest wall, and gentle palpation will then determine the necessary data concerning size, shape, consistency, etc. If no gross lesion is found, a light movement of the finger tips over the breast, from periphery to nipple, may disclose the smaller lesions.

The regional recurrences in cases that seemed favorable at the time of the primary operation, seem often to be due to faulty surgical procedures. The desire to avoid disfigurement may lead to unwise conservatism in the extent of the incision, and in the amount of skin removed. The desire to obtain an ideal healing may influence the operator to dissect the skin flaps very thick so that they will not be likely to become necrotic at the margins because of lack of vascular supply. The desire to shorten the duration of the operation may result in a hurried and incomplete dissection of the axilla. Any of these factors may lead to failure of cure; and it must be noted, with regret, that many cases show cancer recurrences in tissues that should have been removed at the primary operation.

With the present unsatisfactory percentage of cures the radical breast operation presents a serious responsibility to the surgeon. Conservatism is ill advised; rather, the limits of the operation and the time given to its performance should be extended. The long Meyer-Halsted incision gives free access, and there will be no axillary contracture if the axillary crossing is made at a level one-third of the distance from the pectoral fold to the clavicle. A Thiersch skin graft is not objectionable, and is best done as a primary procedure when it is required. In the dissection of the axillary fat and lymphatic structures, the principle of the unbroken envelope necessitates the removal of anterior and posterior fasciae intact. Since so many recurrent cases show firm fixation of the cancerous nodes to the sheath of the axillary vein, it seems desirable to remove the anterior and internal portion of the vein sheath at the primary operation, as a part of the lymphatic envelope. For similar reasons, and for obtaining better access to the axilla, it is desirable to remove the pectoral muscles completely.

With reference to the incision of the breast tumors for diagnosis before operation, either for frozen sections or for later reports, one cannot emphasize too strongly the unwisdom of this procedure as a routine measure. With care, patience, and good judgment, the usual means of examination will lead to but few mistakes in diagnosis. Among the breast conditions that resemble cancer clinically, perhaps the closest simulant is a tuberculosis that has not yet broken through to form sinuses.

DR. JOSEPH WIENER expressed his preference for the Stewart incision which he has used for five years. For twenty years he used the Halsted, but

## TUMORS OF THE BREAST-BENIGN AND MALIGNANT

had discarded it. With the Stewart incision there is less oedema of the arm, and it has numerous advantages over the Halsted incision where the tumor does not lie too high.

As regards late recurrences, Doctor Wiener had a patient from whom twenty-one years ago he removed the right breast. Ten years afterward she had a recurrence and he removed the opposite breast. She has now been free from recurrence for ten years.

As to lymphoedema, early passive motion seems to limit this. The arm is kept against the chest for six days and after that it is mobilized.

He has been giving Coolidge treatments in every case of carcinoma of the breast for the past six years. In following these cases up he has noted a few striking results. One case developed extensive metastasis in the sternum, a growth as large as a fist, which disappeared under Coolidge treatment, but some months later a cerebral metastasis occurred. Great aid can be given with it. Some women are alive and well to-day as a result of it who would otherwise probably have died of metastases.

DR. CLARENCE A. McWILLIAMS said that in 1900 he published (*Medical News*, April 28th) an analysis of 100 cases of cancer of the breast which had been operated upon in the Presbyterian Hospital. Since that time the technic of the operation has changed but little, but the patients are coming now much earlier for operation. Thus, the axillary glands were palpable in 48.9 per cent. of the cases while after operation the glands were found cancerous by the microscope in seventy-eight and six-tenths per cent. of the patients. Thirty-four per cent. showed no recurrence at the end of three years. Recurrence took place locally in fifteen cases. The average length of time from the period of recurrence to death was five months. It would seem that little change can be made in the thoroughness of the operation for cancer of the breast, and the future improvement would seem to lie in getting the patients earlier and to supplement the operation by treatments with radium and the X-rays.

DR. RICHARD LEWISOHN expressed his belief that a pathologist should be present at every operation for tumor of the breast. No radical amputation of the breast ought to be performed without previous inspection of the tumor. He was surprised to hear Doctor Semken state that radical amputation should be performed without exploration of the tumor. The question of malignancy cannot be definitely settled by palpation in many cases. Tumors which appear to be malignant on palpation often prove to be inflammatory on section. In order to avoid unnecessary amputations of the breast, careful macroscopical and, if necessary, microscopical inspection of the tumor is certainly indicated.

DR. WILLIAM CRAWFORD WHITE had hoped that the discussion would bring out some opinions as to the wisdom of local excision in localized cystic mastitis. He had followed that procedure for some years with satisfactory results.

This series of Doctor Peck had been worked up without reference to radium or X-ray and it will be interesting to note the results after their use.

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DR. CHARLES H. PECK, in closing the discussion, commented first on the remarks as to the practice of excising the tumor and delaying the radical operation to await the pathological diagnosis; he did not advise this procedure. He simply looked up these cases in which, for one reason or another, radical operation was not done at once, eleven in all, and was surprised to find five were well. Another point he wished to emphasize was that he did not cut into the tumor; he excised it with a safe margin of breast tissue, and it was then cut, outside the body, by the pathologist. He got what information he could by the gross appearance and, if at all in doubt, had a frozen section made at once. This was his routine procedure, and he believed, the best practice.

Perhaps he had stated results a little imperfectly. He followed 118 cases in the malignant group and lost track of seventy-seven. Six of these died in the hospital following operation. The custom has been to operate upon any case that offers the likelihood of even temporary relief and not to refuse cases so advanced as to offer no hope of radical cure. Of the 112 cases followed, which recovered, fifty-three are well and free from recurrence at the present time and twenty-six of these are well more than five years. Eleven out of the twenty-six had axillary metastases at the time of operation.

In regard to the question of supraclavicular node dissection, he had never done that, but confessed that he had seen quite a few cases where the first recurrence was in the supraclavicular nodes. If recurrence had come there it has been dealt with either by X-ray or radium treatment or by secondary operation.

The transverse incision had been selected almost exclusively for the past six or seven years. It is an adequate incision, giving good exposure, and it permits the removal of a large area of skin without the necessity of grafting. Excision of the rectus sheath had not been made a part of the routine technic, but was often done. Diffusion of the disease in all directions is a tendency in carcinoma, as pointed out by Handley, especially in the subcutaneous tissue and lymphatics, and it is important to remove as wide an area of this tissue as possible by the oblique dissection beneath the skin flaps, which he advocates.

As to how long it is safe to wait in recently discovered lumps, having the characteristics of a chronic mastitis, it is difficult to say. Some such masses will disappear completely in from three to six weeks. If they fail to disappear in that time, removal is the safer course to follow.

### CARCINOMA OF TRANSVERSE COLON, RESECTED UNDER LOCAL ANÆSTHESIA

DR. JOSEPH WIENER presented a specimen with the following report: E. S., seventy-two years old, first seen October 15, 1921. Ten years before he had had icterus for several months. Nine months before he had begun to have severe right iliac pain. At the start the attacks of pain came on every two to four weeks, lasting several days. During the attacks of pain he was constipated. The pains gradually increased in frequency until they were present almost constantly. Con-

## CARCINOMA OF TRANSVERSE COLON

stipation became more and more marked and was not much improved by cathartics. No blood was ever noticed in the stools. He lost eighteen pounds in eight months and weighed ninety-eight pounds. He had lost a great deal of sleep and felt very weak. He had had an intermittent diabetes for four years without acidosis. During the preceding six months there had been some abdominal distention with nausea, but no vomiting. Radiographs taken nine months before had been negative.

On examination there was general abdominal tenderness. The transverse colon was filled with hard faeces. On deep pressure there was apparently an indefinite mass in the right iliac fossa. Rectal examination revealed a small, hard prostate. Haemoglobin, fifty-two per cent. The clinical diagnosis was carcinoma of the cæcum with subacute intestinal obstruction. For six days he was given cathartics and enemata until the bowels were thoroughly cleaned out. His digestion was so poor that he could only take small quantities of soft food, and he lost a few pounds more before it was thought safe to open the abdomen. He was given ten minims of tincture of opium an hour before operation. Under apothecine and adrenaline anaesthesia the abdomen was opened through a right upper rectus incision. A large constricting tumor was found in the middle of the transverse colon which was freely movable. There was only one enlarged gland in the mesocolon. An exclusion operation was decided upon as the first step to a subsequent resection of the colon. The hepatic flexure was divided between two rows of linen sutures. The proximal end was closed with two additional layers of linen sutures. A side-to-side anastomosis between the closed proximal end and the descending colon just below the splenic flexure was done, using clamps and Connell linen sutures, as for a gastro-enterostomy.

The transverse colon, together with the mesocolon and the enlarged gland, was then removed and the splenic flexure closed with three layers of linen sutures. The liver appeared normal; the colon proximal to the tumor was very hypertrophic.

The entire operation took two and a quarter hours and the most meticulous care was taken to control even the smallest vessels on account of the poor general condition. At no time during the operation did the man complain of pain, and the pulse was not over seventy.

Immediately after operation he took small amounts of coffee and whisky by mouth. On the second day he passed gas freely, but he gradually became weaker; forty-eight hours after operation he was given 700 c.c. of blood by the syringe method. Twelve hours later he went into coma which lasted eight hours. Under active stimulation he came out of the coma completely. He never vomited after operation and retained whatever nourishment he took. He gradually grew weaker and seemed to lose weight daily, although he weighed only ninety-eight pounds at the time of admission, and probably a few pounds less at the time of operation. The skin sutures were removed on the fourth day. Death took place five days after operation. No autopsy obtained.

Of the more than 400 operations that the speaker had done under local anaesthesia, this case represented the longest and most extensive. At no time during the operation did the patient complain of pain, and at no time was he restless. It was thought that if the operation had been done a few months earlier an operative recovery would have been obtained.

## CORRESPONDENCE

### OSTEOPHYTIC ANKYLOSIS OF ELBOW

EDITOR ANNALS OF SURGERY:

SIR:

I forward to you this case report of a condition entirely novel to me, of special note, as showing how extensive a result may follow a slight injury.

The patient, Miss T. T., age fifteen, while running, fell to the ground, and as a result of the fall injured her left elbow. This occurred about November, 1920. Her doctor made a diagnosis of fracture and treated it as such, a perfectly correct treatment. When the splints were removed there was found to be limited motion in the joint. This was treated by massage and passive motion for a period of two or three months. There being no improvement, rather less motion, the patient was referred to my Clinic at St. Joseph's Mercy Hospital. When an X-ray picture was taken a condition was found as revealed in the picture of that date (March 12, 1921) (Fig. 1). It will be seen that there was an arch of bone grown across the joint anteriorly from the humerus to the ulna, producing almost complete ankylosis at an angle half-way between full extension and a right angle. However, the patient wished to try massage and passive motion for a time longer. She was not seen again until June 15, 1921. The condition being unchanged July 23, 1921, the patient came for operation. The operation consisted in chiselling out the arch of bone which produced the ankylosis, the result being as shown in the picture taken immediately afterwards (Fig. 2). Motion was immediately restored and two months after the operation motion in the elbow is almost normal, the X-ray picture taken at that time showing no recurrence of the bony arch. At the present time the young lady has almost normal motion and the full use of her arm.

GEORGE KESSEL, M.D.,  
*Surgeon-in-Chief.*

St. Joseph's Mercy Hospital,  
Cresco, Iowa.

### UMBILICAL AND INGUINO-LABIAL HERNIA IN WOMAN OF ADVANCED AGE

EDITOR OF ANNALS OF SURGERY:

SIR:

I offer the report of the following case because the conditions are comparatively rare in women of advanced age, and second, because this woman was a drug addict. In order to arouse sympathy she would display her physical infirmities to the casual passer-by on the street so that she might obtain money to purchase her desired narcotic. She was a negro woman, age of seventy-nine years. She became a public nuisance and the police brought her to the hospital for treatment. The



FIG. 1.—Osteophyte producing ankylosis of elbow.



FIG. 2.—Osteophyte removed freeing joint.



FIG. 3.—Umbilical and inguino-labial hernia.

## CORRESPONDENCE

surface of her skin, especially on the arms and chest, presented numerous elevations, the result of self-administered hypodermic injections. The abdomen presented two distinct hernia protrusions, one to the right of and involving the umbilicus, the other in the lower inguinal region (Fig. 3). The umbilical hernia was reducible but was the seat of much pain, whereas the inguinal hernia was irreducible but not very painful, but its bulk interfered greatly in walking.

The inguinal protrusion had a circumference of five inches; was twelve inches long and involved the right labia majora.

The umbilical hernia was operated upon first, after the Mayo method. The omentum was found densely adherent to the peritoneum, which condition was the cause of her pain.

One month later the inguinal hernia was operated upon. The incision was made from the midpoint of the base of the tumor to the end of the same and the whole mass was dissected to the peritoneal sac. Within the sac was omentum and coils of intestines—both were closely adherent to the sac and were detached with difficulty. All the raw surfaces on the intestines were whipped over with fine catgut suture. All raw surfaces were covered in to prevent post-operative adhesions. The omentum was ligated with mattress sutures and the stump returned to the abdominal cavity. Entire contents of the sac were returned to the abdominal cavity. The sac was ligated high up and cut off and the stump dropped into the peritoneal cavity. The widely dilated external ring was closed completely with chromic catgut. The line of suture was reinforced by overlapping fascia secured with strong mattress catgut sutures.

Patient made an uneventful recovery and left the hospital at the end of three weeks in good condition.

Wm. J. THOMPKINS, M.D.,  
*Superintendent Colored Division,*  
*Kansas City General Hospital.*

Kansas City, Missouri.

## BOOK REVIEW

THE PATHOLOGICAL GALL-BLADDER. By ARIAL W. GEORGE and RALPH D. LEONARD. New York. Paul B. Hoeber, 1922.

This book is the second volume of the *Annals of Röntgenology*, edited by Dr. James T. Case. It takes up the question of depiction of pathologic conditions of the gall-bladder. The well-known proficiency of the authors to visualize, with the X-ray, lesions in this region is well known, and they claim a correct reading and interpretation in eighty-eight and four-tenths per cent. of the cases examined, which have been checked operatively. The details of the technic employed to obtain such results are very definitely and succinctly given.

There are shown 135 Röntgen-ray studies, forming forty-four full-page plates, which show practically all of the pathological conditions which can be found. These include the direct visualization of the thickened gall-bladder, and the relation to the underlying kidney with and without stones; the points of differentiation between renal and gall-bladder lesions, in addition to the indirect evidence of the deformity of the stomach and duodenum from external pressure or adhesion to the gall-bladder. The plates are all beautiful reproductions on very highly calendered paper. These give to the reader types for comparison and interpretation of shadows upon which a very positive diagnosis may be made. Description of the plates are given in English, French and Spanish.

The value of such a publication cannot be overestimated, and must prove of the utmost advantage to the careful clinician, or the surgeon in the proper conduct of cases presenting atypical abdominal subjective symptoms.

JAMES T. PILCHER.

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